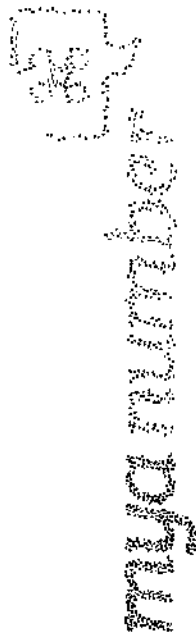EXHIBIT A

UNDER SEAL

EXHIBIT B
MYA NUMBER, AT&T MOBILE ONE NUMBER (mya#), WEARABLE DEPLOYMENT,
POWERED BY MYA NUMBER
SLIDE DECK
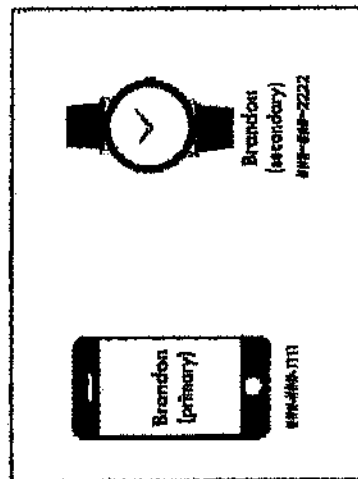
myaNUMBER

AT&T Mobile One Number (my#)
Wearable Deployment
Powered by myaNUMBER
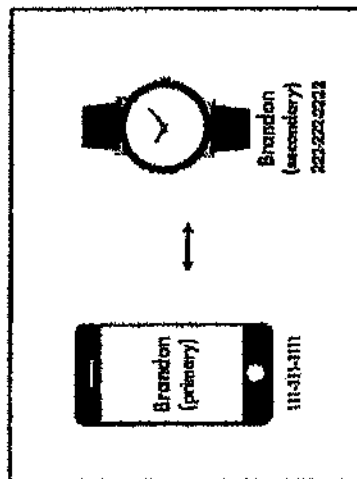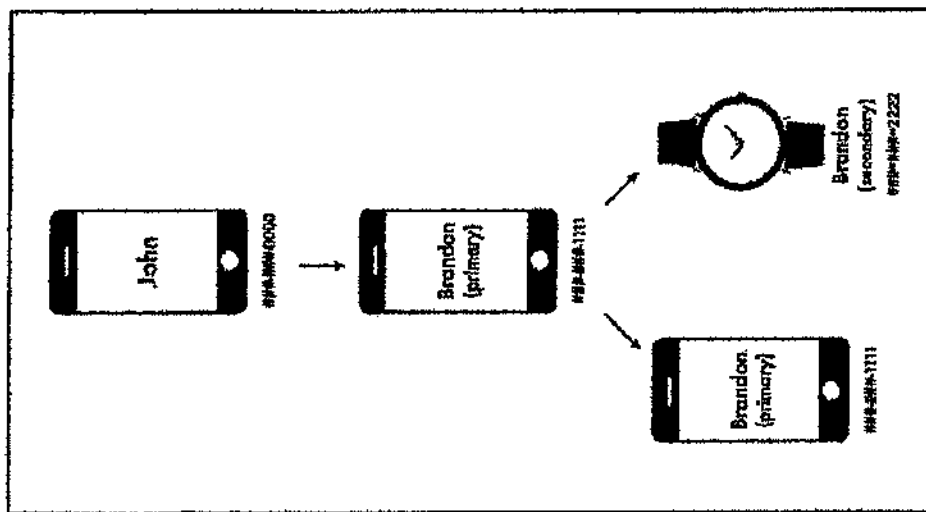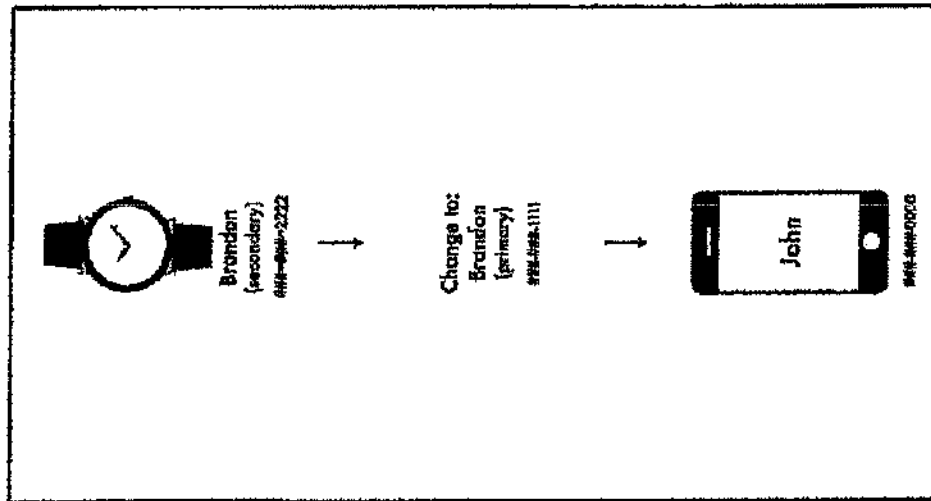
Twinning

Twinning

- A web application to setup Twinning
- The web application is iFramed into an Iam+ Desktop App
- Type in your primary MSISDN
- API sends link to download the app in the Device specific App store
- Web app keeps a status on the progress through the flow while the user is completing the twinning experience
- User completes twinning setup on the device
- Web app updates to display a completed state and the numbers that are twinned
- Users will be walked through this in store after buying a smartwatch

1.

Brandon
(primary)

###-###-1111
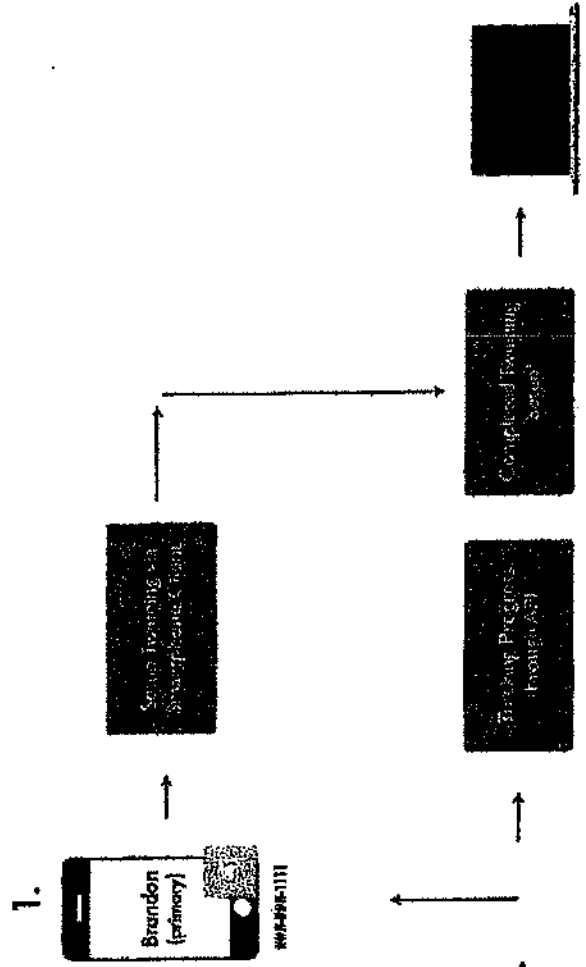
Twinning

- Android Application to setup two devices that will be twinned together
- We read the MSISDN from the primary device via the SIM card
- Type in the MSISDN for your secondary device (watch)
- API sends text message to secondary MSISDN with a 6 digit unique pin
- User goes back to their primary device and enters in the pin they saw on the secondary device
- User must complete the AT&T In App Messaging Consent Dialog to move one
- myaNUMBER validates the pin and creates a complete twinning record

1. Brandon [primary]
2. Input the phone number of your secondary device
3. myaNumber Web Services — Save Primary Number / Save Secondary Number / Save post number to secondary number with a pin code
4. Brandon [secondary]
5. Brandon [primary] — Enter pin
6. If code is correct / Save secondary number and primary number for that user

See next page for web setup flow...
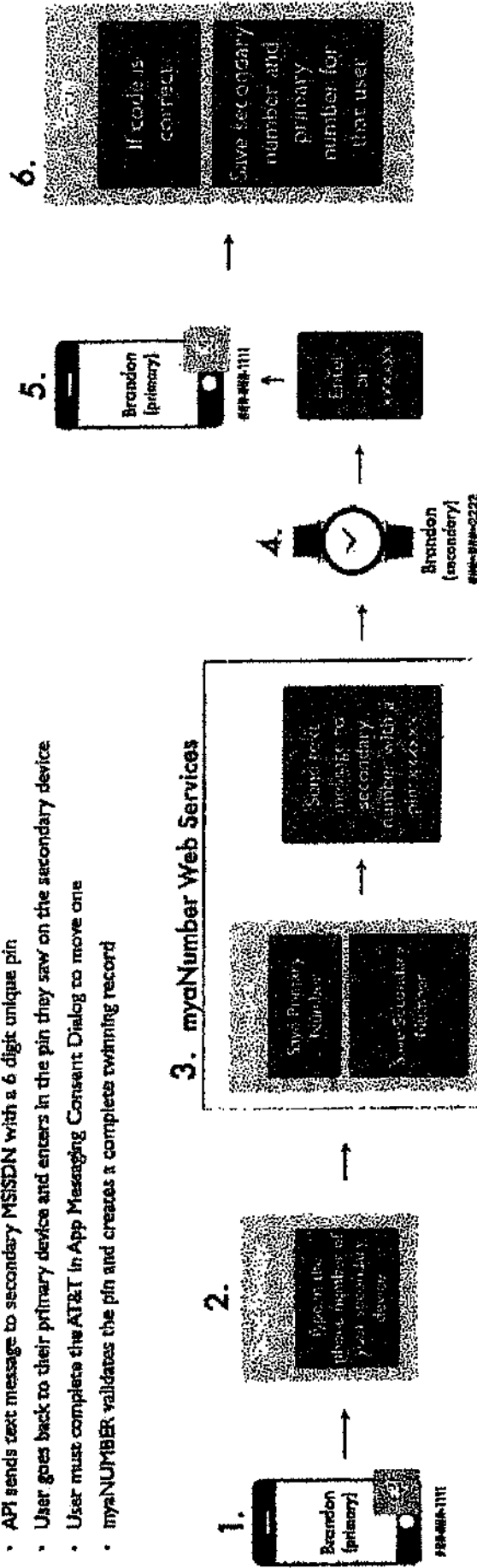
Twinning

- When setting up, once we know the phone number, the device will register with iam+ notification server for all device to API communication

1.

2.

Brendan
(secondary)
###-###-2122

Inbound Call

1. John
##-###-0000

2. Call Forwarded to Virtual Number

Virtual Number

##-###-1111

3.

4. Place Call to Primary
+
Mask caller ID

From John
##-###-0000

4. Place Call to Secondary
+
Mask caller ID

From John
##-###-0000

5. Brandon (primary)
##-###-1111

Hang up this device

Brandon (secondary)
##-###-2222

User answers on this device
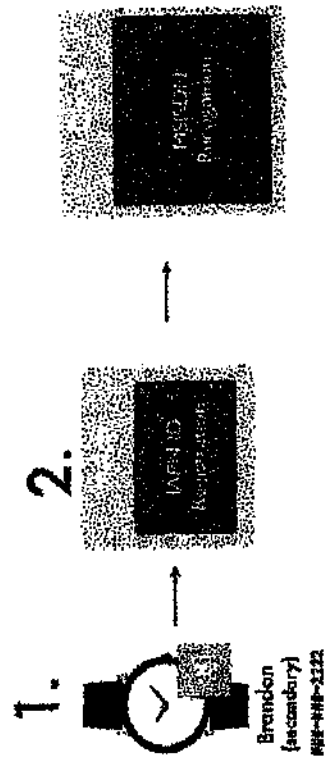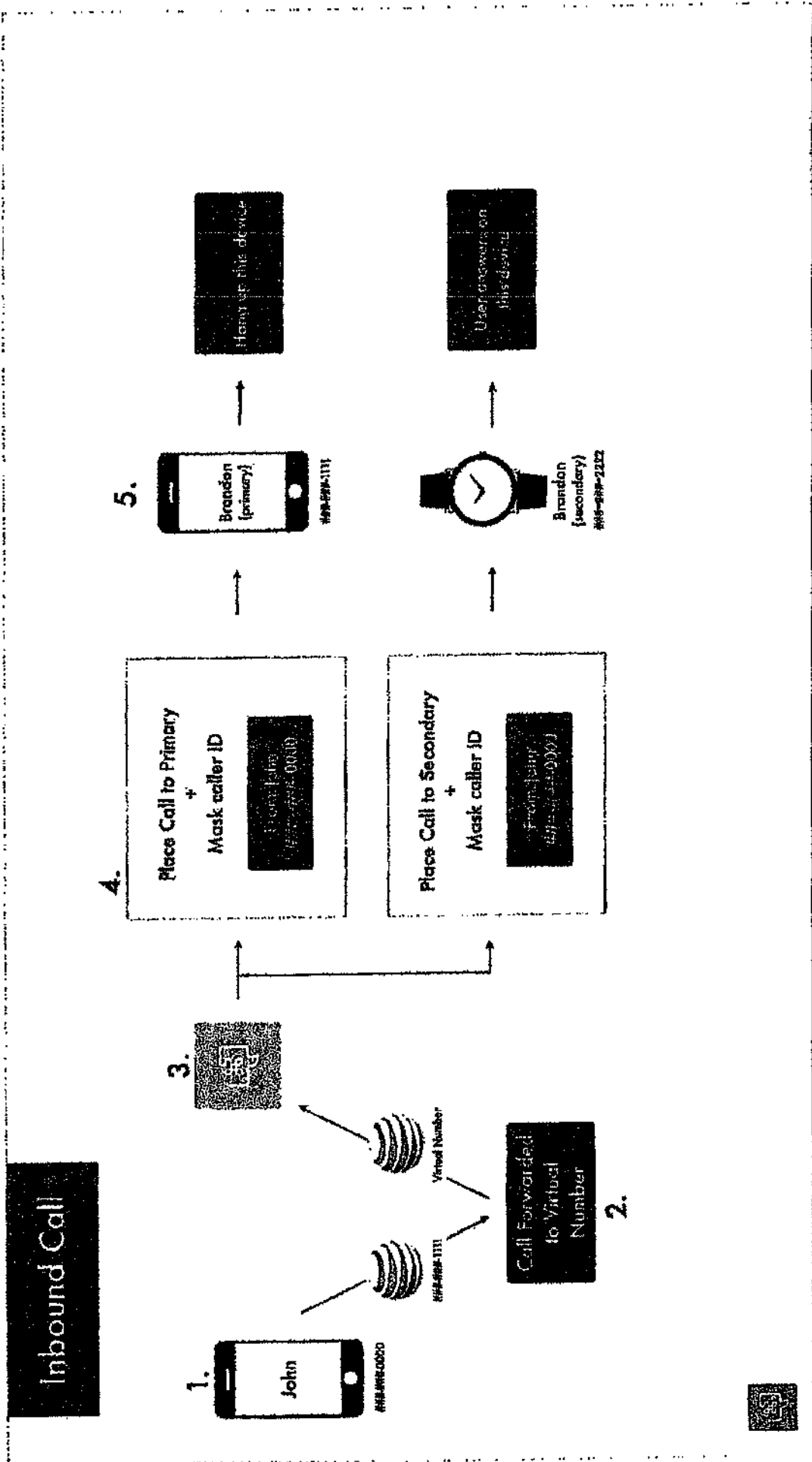
Outbound Call

- Outbound call from primary goes directly directly through the network without interacting with myaNUMBER at all

1.
Brandon
(primary)
###-###-1111

2.
John
###-###-0000
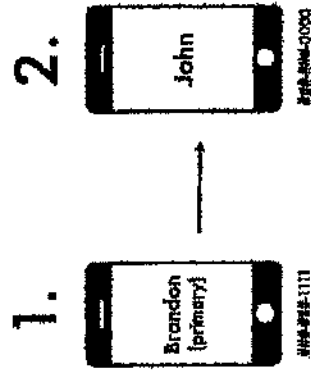
Outbound Call

- Outbound call from smartwatch is placed to myaNumber Virtual Phone Number if Twinning is On
- myaNumber reads the number and finds the record for the primary number
- myaNumber places the call to the destination number (John) and masks the caller ID via the SIP connection to display the primary number

myaNumber Web Services

1.

Brandon
(secondary)
###-###-2222

2.

Call from Brandon's Secondary	Record for Brandon's Primary	Call from Brandon's Primary
To: John		To: John

3.
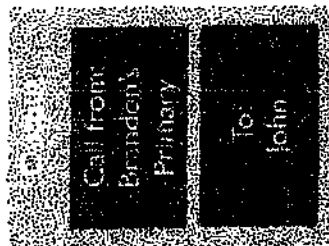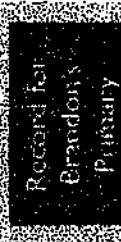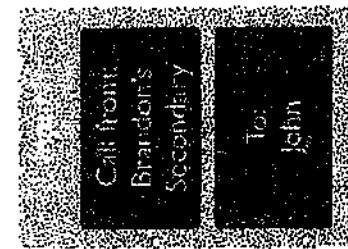
John
###-###-0000

Twinning

Messaging

- John texts Brandon's secondary number directly
- The text message goes straight through without interacting with any outside services

John
###-###-####

Brandon
(secondary)
###-###-2222
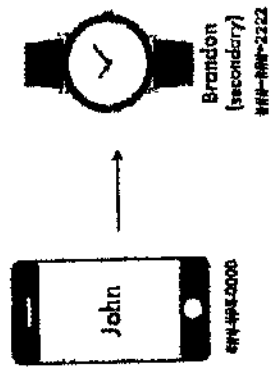
Messaging

- John texts Brandon's primary number
- Brandon receives the text message on his primary device
- The AT&T Text Messaging Cloud stores a copy of the message in its DB
- AT&T Messages sends a notification to myaNumber's messaging server notifying it of a new message
- myaNumber notifies the device that a new message is ready for retrieval
- The secondary device checks for the delta in the in app messaging API
- The In App Messaging API sends the message to the device

1. John

2. Brandon (primary)

3. AT&T Messaging Cloud

4. AT&T Messaging API

5.

6.

7. Brandon (secondary)
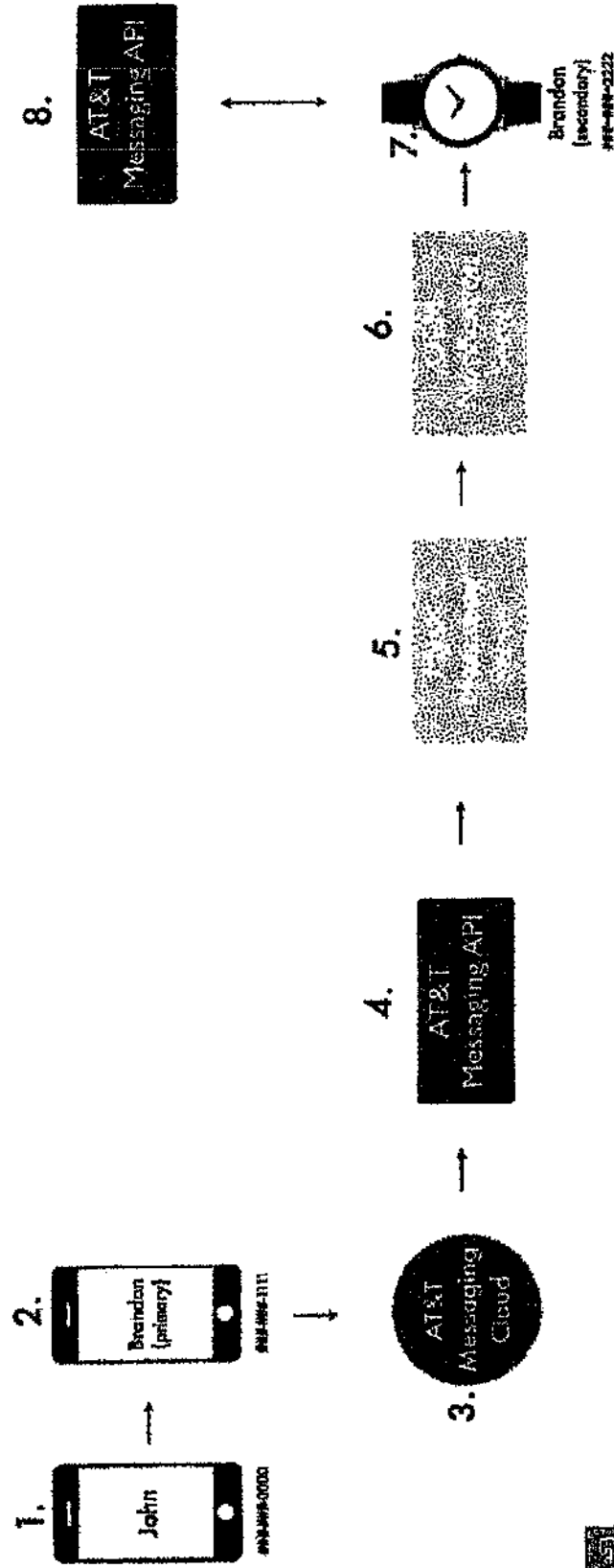
8. AT&T Messaging API

Messaging

- Brandon sends John a text from his Primary Number
- John receives the text on his device
- The messages gets stored in the AT&T cloud
- The watch uses the AT&T In App Messaging API to get the past sent messages from the primary device to display in message threads

1.
Brandon
(primary)
###-###-1111

2.
John
###-###-0000

3.
AT&T
Messaging
Cloud

4.
AT&T
Messaging API

5.
Brandon
(secondary)
###-###-2222
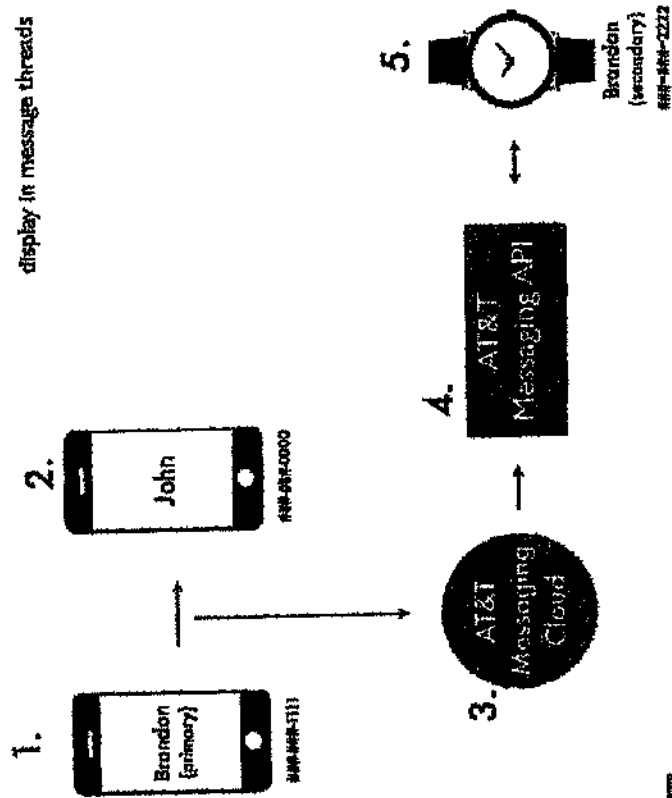
Messaging

- Brandon sends John a text message from his secondary device
- The SMS goes directly to John without using any other services

1.

Brandon
(secondary)
###-###-2222

→

2.

John

###-###-0000
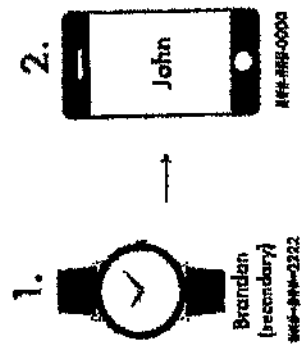
EXHIBIT C
USE CASE PREPEARED BY AT&T MARKETING

Setting up NumberSync and Delivering Outstanding Demos

1
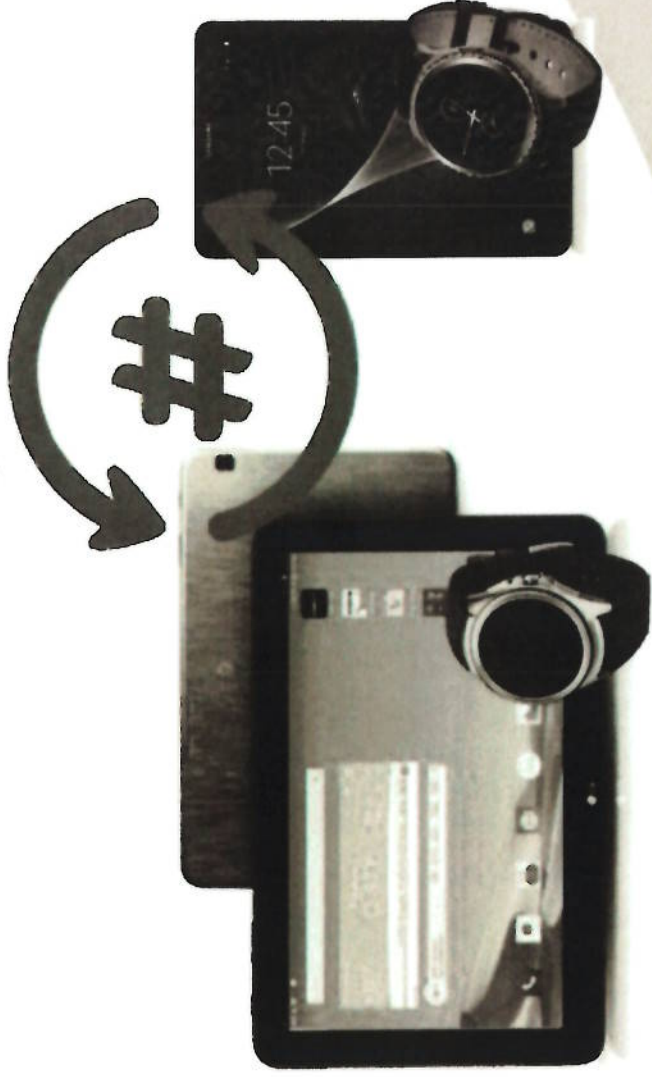
Why Demo NumberSync?

NumberSync is a First of its Kind network application *exclusive to AT&T* that syncs your wireless phone number across all of your compatible devices!

Leverage promotions that offer savings on wearables and tablets when purchasing a new smartphone.

Seeing (and hearing) is Believing!

While you tell one customer about NumberSync, you can make one phone call and *show everyone in the store!*

Add Value without increasing cost: There is *no monthly charge* for convenience of taking your calls on whichever device is in your hand – Phone, wearable, or tablet.

Before You Begin: myAT&T

- You will need a myAT&T User ID associated with each smartphone used in the NumberSync demos.
  - myAT&T User IDs must be set up for the smartphone mobile numbers, not the numbers associated with additional devices.
  - NumberSync lines must be postpaid wireless accounts; NumberSync is not available for pre-paid accounts.
- If your store already has myAT&T accounts set up, ensure the smartphones are correctly identified. You will need the User ID and Password for each account.
- If no myAT&T User IDs exist, they can be established during the NumberSync set up process.
- Make note of the Username & Password and keep for future use.

myAT&T

User ID

Password

Save User ID

Login

Forgot? | Create p...

Register

Chat I'm available

Enable AT&T NumberSync℠!

NumberSync lets you send and receive calls or texts on your smartwatch using your primary mobile number...even when your phone isn't with you or turned on.

Select "OK" to log in to myAT&T and set up NumberSync.

SKIP   OK >
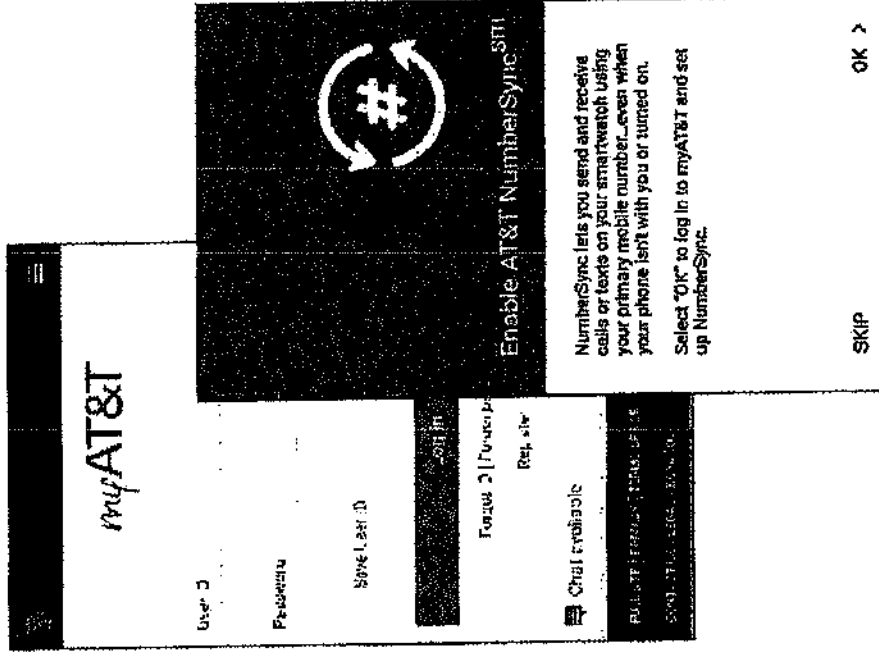
Pro Tip

myAT&T is not just for account management! Every user should set up myAT&T to manage THEIR features, including NumberSync and AT&T Locker.

Before You Begin: Know Your NumberSync Circles

NumberSync works "Better Together"

Samsung Set-Up

- Galaxy S7 or newer Video Call capable Samsung smartphone

- Samsung Gear S2 or S2 Classic

- Samsung Tab E or Tab S2 with software update
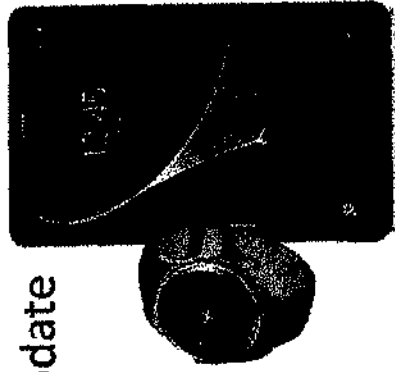
LG Set-Up

- LG G5 (with software update) or newer Video Call capable LG smartphone

- LG Watch Urbane 2nd Edition LTE

- LG G Pad X 8.0, or G Pad X 10.1 with software update
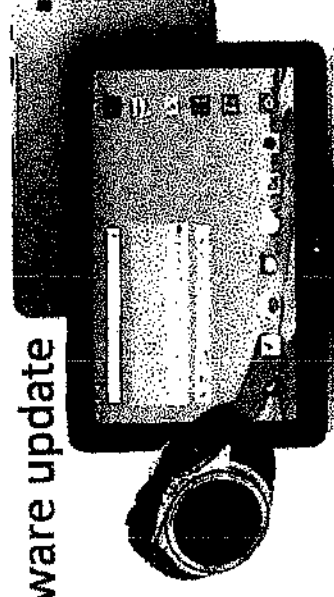
Make sure smartphones are properly provisioned for HD Voice and Video Call. Software updates may be required; re-start devices after updates are completed.

Before You Begin: AT&T Messages Backup & Sync

- NumberSync for wearables utilizes AT&T Messages Backup & Sync (AMBS).

- In order for NumberSync to operate correctly, the primary smartphone's default messaging application has to have cloud messaging set up.

- To do this:
  - Go to Messages > More > Settings > AT&T Messages Backup & Sync
  - Tap **Turn it On** if not already enabled.
  - An SMS confirmation will be received when AMBS is configured and ready to use.

Notifications

Backgrounds and bubbles

Quick responses

Spam filter

AT&T Messages Backup & Sync

More settings

Emergency alert settings
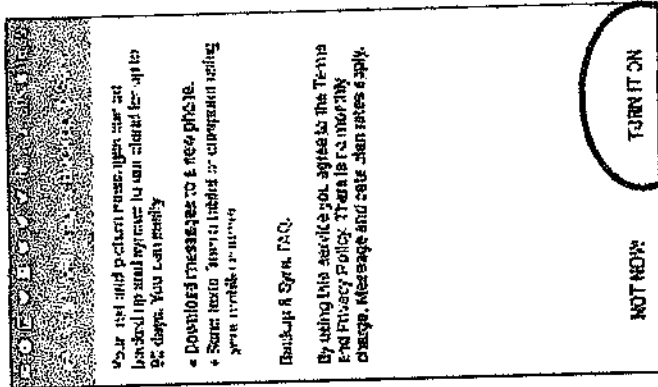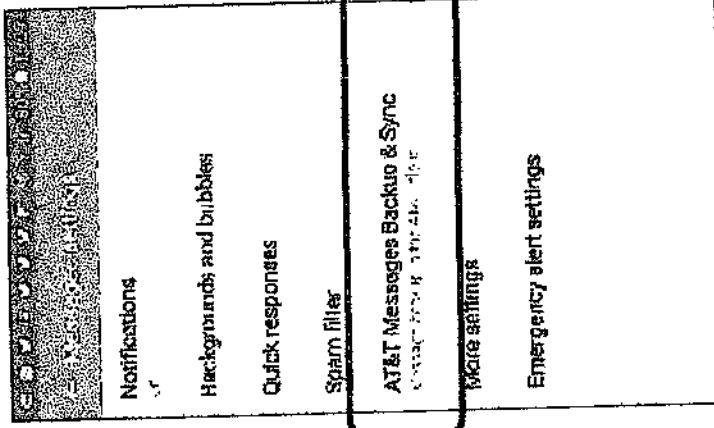
Pro Tip

With AMBS turned on, customers can log into messages.att.net with their myAT&T User ID and send/receive messages from their computer, too.

- Download messages to a new phone.

Backup & Sync FAQ.

By using this service you agree to the Terms and Privacy Policy. There is no monthly charge. Message and data plan rates apply.

NOT NOW

TURN IT ON

5

Before You Begin: Tips for Best Results

For Wearables

Perform a factory reset before starting the NumberSync set up process on store COU devices (not necessary for new or customer devices).

- Samsung Gear S2/S2 Classic
  - Confirm that any current NumberSync relationships are deactivated
  - On the Settings screen, tap: Gear Info > Reset Gear > Factory Reset

- LG Watch Urbane 2nd Edition
  - Swipe down from the top of the screen, then swipe right-to-left four times
  - **Tap Settings**
  - Scroll down and tap **Unpair with phone**
  - Tap the check mark icon to **Unpair and factory reset**

myAT&T

- Keep the store's myAT&T User IDs and Passwords in a convenient, visible place; you will need them to set up NumberSync and other services on future devices.

NumberSync Phone Numbers

- Post the phone numbers of the NumberSync smartphones where all employees can see them.

- All employees should add them to their Contacts on their COU devices to perform a NumberSync Demo at any time.

Set Up Guide: NumberSync for wearables using the Samsung Gear S2

1. Press and hold the **Power button** to turn on the watch.
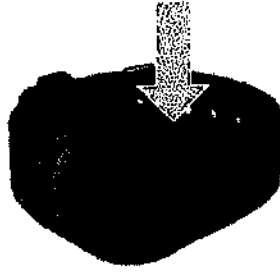
2. To connect your watch with your smartphone, the **Samsung Gear Manager app** must be installed on the smartphone.

If installed, access via **Apps > Samsung Gear** or **Apps > Samsung > Samsung Gear.**

To install the Samsung Gear app, tap **Play Store** > search for '**Samsung Gear Manager'** > **INSTALL > ACCEPT > OPEN.**
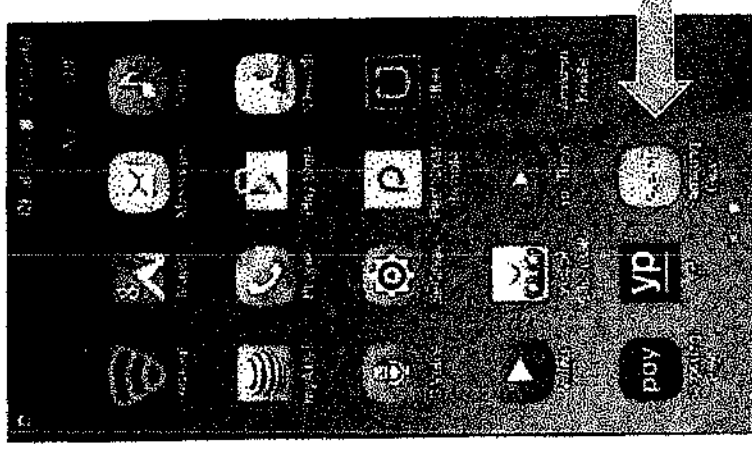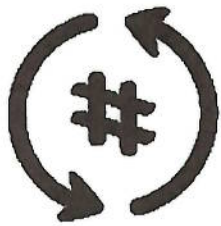
Set Up Guide: NumberSync for wearables using the Samsung Gear S2

3. Start the Samsung Gear Manager app and Tap **CONNECT TO GEAR**

4. Confirm that the smartphone has found the watch by comparing the number in parentheses with the number displayed on the watch. Tap **OK** then **ACCEPT**.

Gear S2

Connect to Gear S2 (B3D4)?

CANCEL   OK

Allow Google to regularly check device activity for security problems, and prevent or warn about potential harm.

Learn more in the Google Settings app.

DECLINE   ACCEPT

Welcome!
Enhancing the smart wearable experience with Samsung Gear.

CONNECT TO GEAR
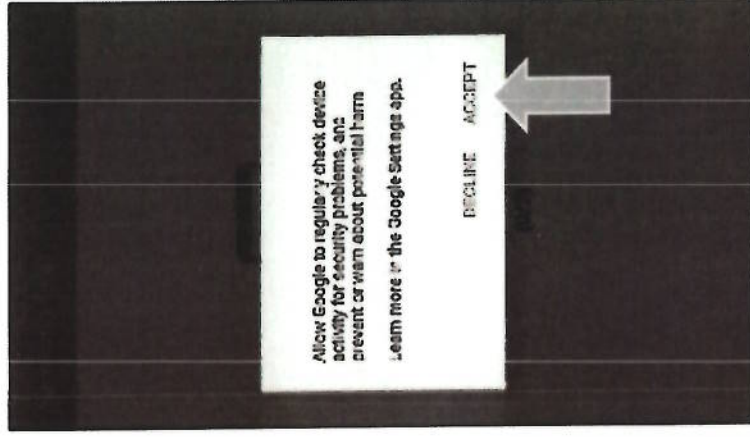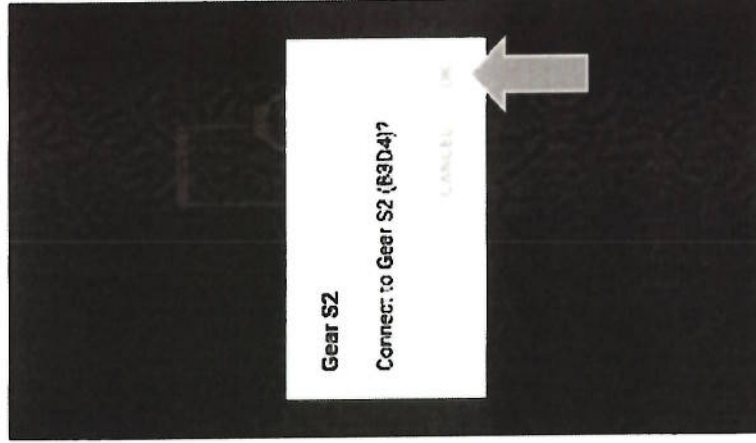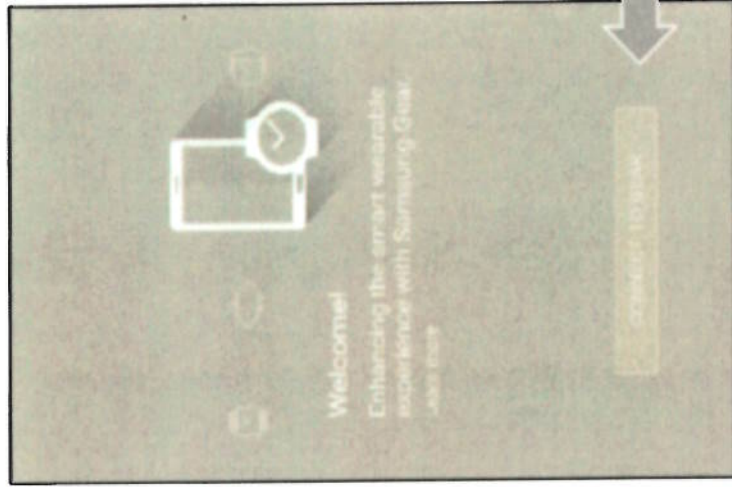
Set Up Guide: NumberSync for wearables using the Samsung Gear S2

5. A Bluetooth passkey will be displayed on the watch.

Gear will connect with
SAMSUNG-SM-
G900A

Passkey 595043

6. Confirm that the Bluetooth passkey on the watch matches the passkey displayed on the smartphone, then tap **OK**

Bluetooth pairing request

Confirm passkey is 595043 to pair with Gear S2 (B3B6).

CANCEL   OK

Connecting to Gear

CANCEL
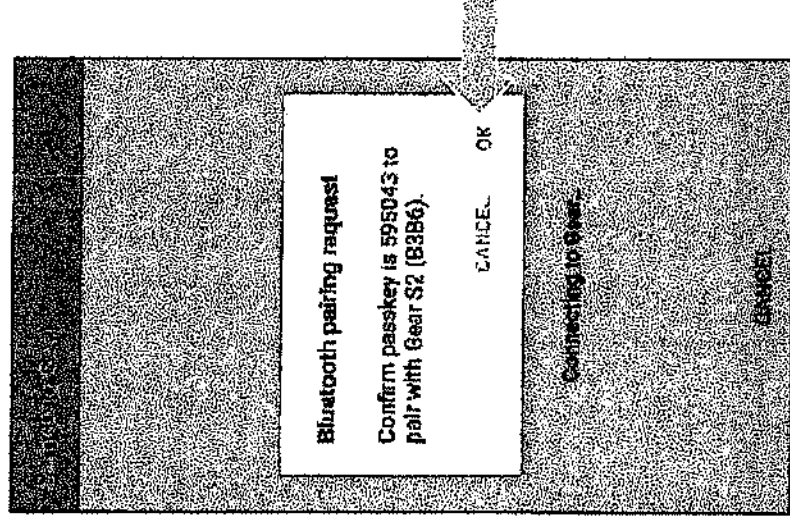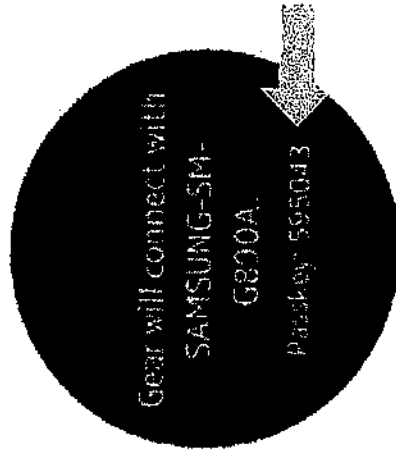
Set Up Guide: NumberSync for wearables using the Samsung Gear S2

7. Read through and accept the End User License Agreement, tap **Agree to all**, then tap **DONE**.
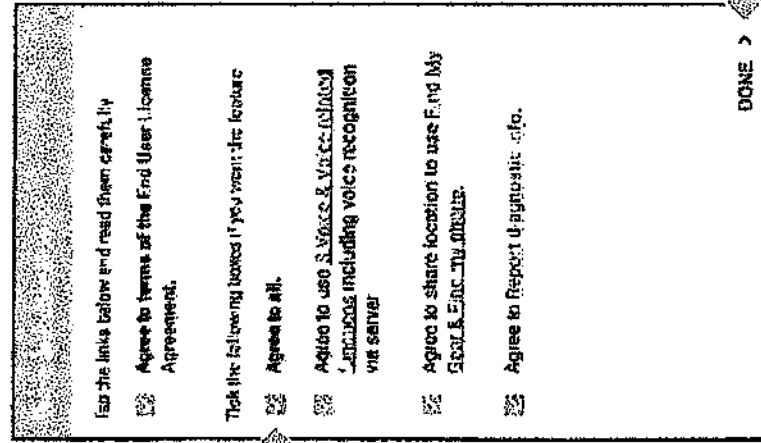
8. To enable **NumberSync**, which allows you to use your primary mobile phone number to make and receive calls and text messages from your watch, tap **OK**.

Tap the links below and read them carefully

- Agree to terms of the End User License Agreement.

Tick the following boxes if you want the feature

- **Agree to all.**
- Agree to use S Voice & Voice control Language including voice recognition via server
- Agree to share location to use Find My Gear & Find my phone.
- Agree to Report diagnostic info.

DONE >

Enable AT&T NumberSync℠

NumberSync lets you send and receive calls or texts on your smartwatch using your primary mobile number...even when your phone isn't with you or turned on.

Select "OK" to log in to myAT&T and set up NumberSync.

SKIP   OK >

Set Up Guide: NumberSync for wearables using the Samsung Gear S2

NumberSync requires an **AT&T User ID** associated with the primary phone number that you want to sync.

5. Enter your **User ID** and **Password**, then tap **Log in**.

5a. IF YOU NEED TO CREATE A USER ID: Tap **Register.**

If you can't remember your login information, tap **Forgot ID** or **Forgot password**

5b. Create an AT&T User ID by completing all fields, entering the wireless number and **last four digits of the IMEI** of the demo device (instead of billing zip code).

User ID

Password

Save User ID

Log In

Forgot ID: Forgot password: Register

Chat available

AT&T wireless number

Billing /ZIP code

Email address

Last 4 of IMEI

Create User ID

User Name

AT&T wireless number · Last 4 of IMEI

Email address

Cancel

Set Up Guide: NumberSync for wearables using the Samsung Gear S2

10. Once logged in, you will be prompted to enter the 5-digit NumberSync code displayed on the wearable.
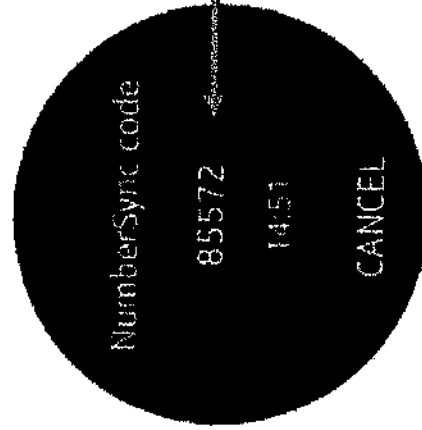
NumberSync code

85572

14:51

CANCEL

Tap the 'I accept the Terms & Conditions' checkbox, then tap Sync.

Sync a wearable

Check your wearable for the sync code and enter it here.

85572

Make sure to read the Important Information

We'll add AT&T Messages Backup & Sync so you can sync your devices. Message and data plan rates apply. Be sure to read these Terms & Conditions

✔ I accept the Terms & Conditions

Sync

Chat available

Help and Support

Contact Us

Log out
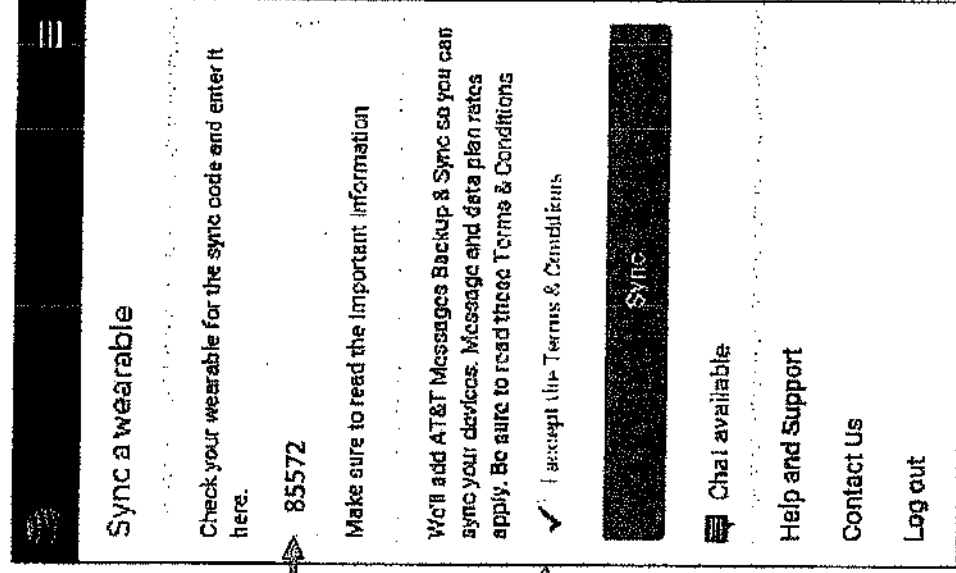
Set Up Guide: NumberSync for wearables using the Samsung Gear S2

11. Setup is now complete! You can give the wearable a nickname (optional) in myAT&T

Manage wearables with NumberSync

425.555.1111
Samsung Galaxy S 6

Add nickname
Samsung Gear S2

Remove a device

Sync a wearable

See how syncing works

Chat available

Help and Support

[+] Feedback

Watch faces

Notifications

Apps layout

Send media to Gear

Settings

Find my Gear

Get new apps

Samsung Gear Apps

Pro Tip

When setting NumberSync up with customers, show them how to turn NumberSync on/off in myAT&T

Set Up Guide: NumberSync for wearables using the LG Watch Urbane 2nd Edition LTE

1. Press and hold the **Power button** to turn on the watch.
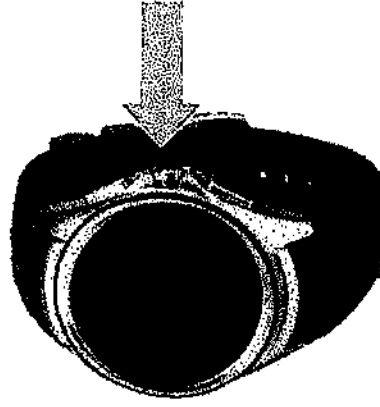
2. Follow the screen prompts to pair to a phone:
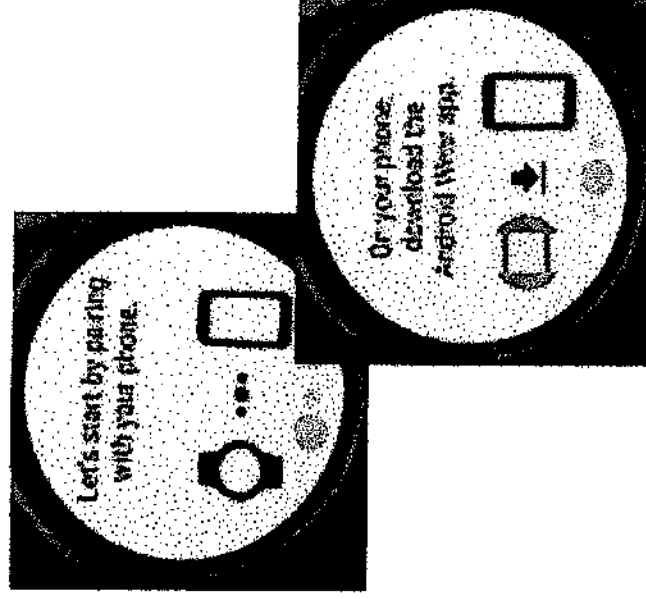
If installed, access via **Apps** > **Android Wear – Smartwatch.**

To install the Android Wear app, tap **Play Store** > search for 'Android Wear - Smartwatch' > **INSTALL** > **ACCEPT** > **OPEN.**

Let's start by pairing with your phone.

Or your phone: download the Android Wear app.

Android Wear - Smartwatch

INSTALL
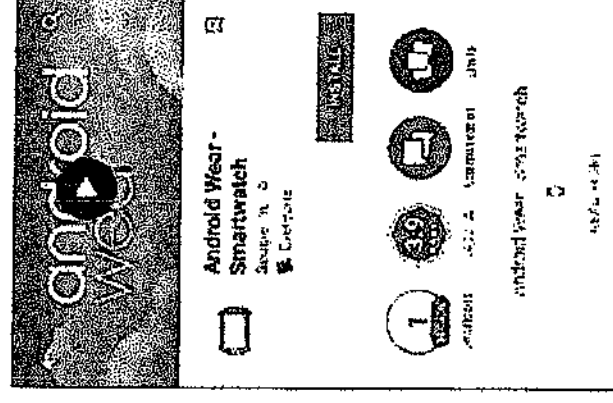
Set Up Guide: NumberSync for wearables
using the LG Watch Urbane 2nd Edition LTE

3. Follow the screen prompts to pair the phone and watch via Bluetooth:

Pair with your watch

Pairing with LG Urbane DAE0

Bluetooth pairing request

Confirm passkey is 139256 to pair with LG Urbane DAE0

CANCEL   OK

Updating.

Let's explore your new watch.
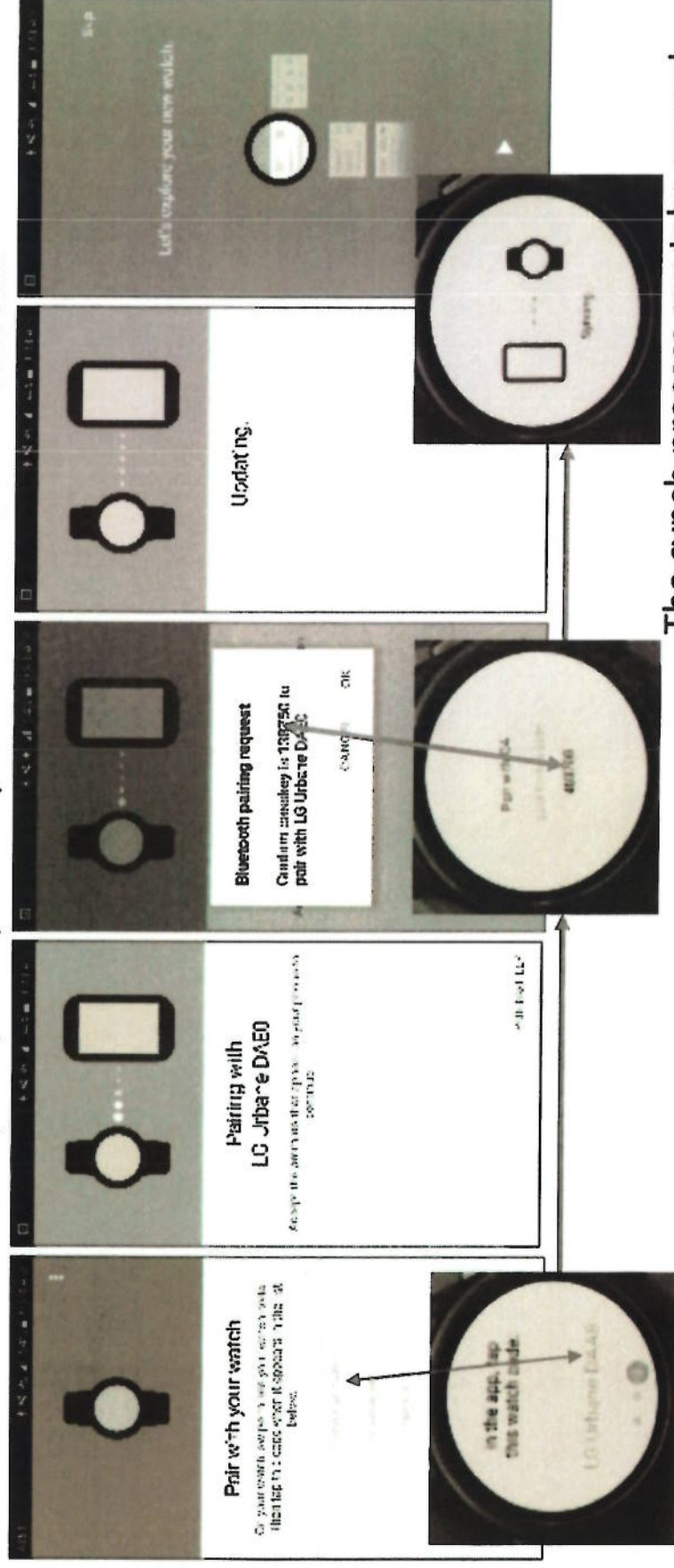
The synch process can take several minutes. When finished, the watch will prompt you to set up NumberSync for wearables.

Set Up Guide: NumberSync for wearables
using the LG Watch Urbane 2nd Edition LTE

AT&T NumberSync℠

NumberSync lets you send and receive calls or texts on your smartwatch using your primary mobile number... even when your phone isn't with you or turned on.

Select **OK** to log in to myAT&T and set up NumberSync.

OK

Cancel

4. After Android Wear set up is complete, a pop-up prompts you to set up NumberSync for wearables.

AT&T NumberSync

Set up

Continue setup on phone
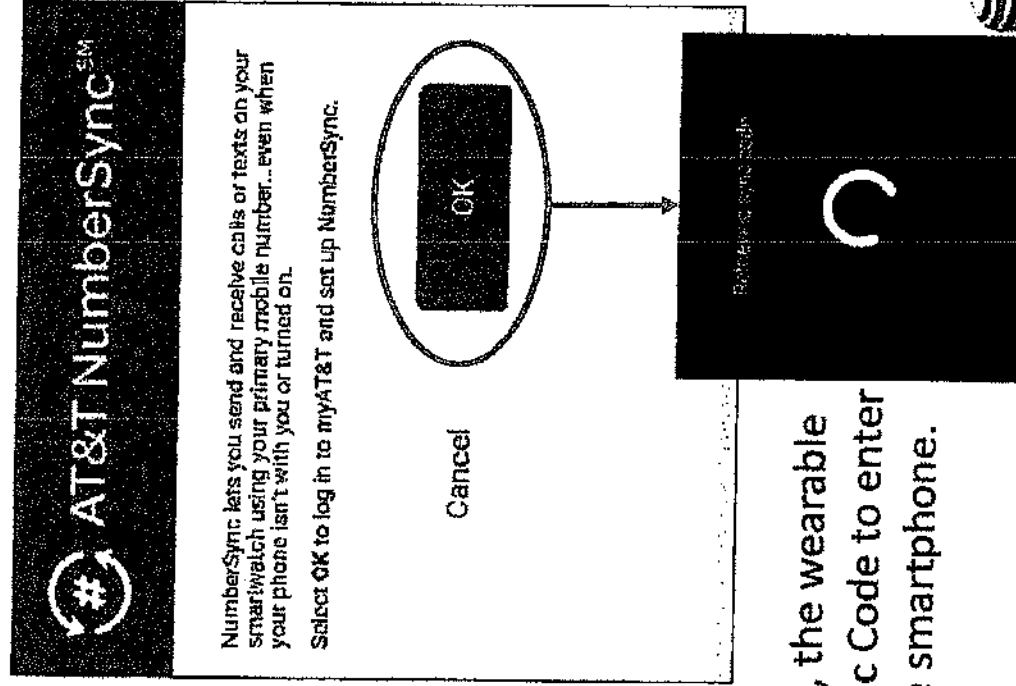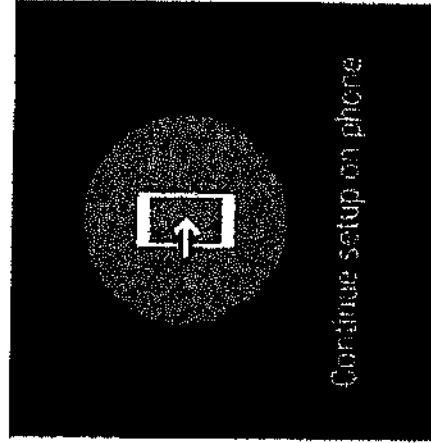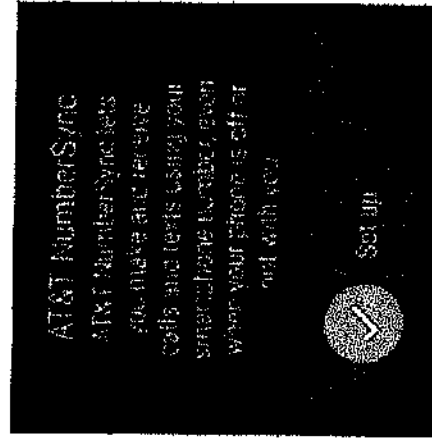
After pressing OK, the wearable will retrieve a Sync Code to enter in myAT&T on the smartphone.
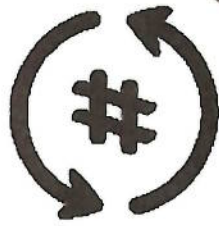
Set Up Guide: NumberSync for wearables
using the LG Watch Urbane 2nd Edition LTE

NumberSync requires an **AT&T User ID** associated with the primary phone number that you want to sync.

5. Enter your **User ID** and **Password**, then tap **Log in.**

5a. IF YOU NEED TO CREATE A USER ID:
Tap **Register.**

If you can't remember your login information, tap **Forgot ID** or **Forgot password**

5b. Create an AT&T User ID by completing all fields, entering the wireless number and **last four digits of the IMEI** of the demo device (instead of billing zip code).

AT&T wireless number

Billing ZIP code

Email address

Last 4 of IMEI

Set Up Guide: NumberSync for wearables using the LG Watch Urbane 2nd Edition LTE

6. Enter the 5-digit NumberSync sync code from the watch, tap the 'I accept the Terms & Conditions' checkbox, then tap Sync.
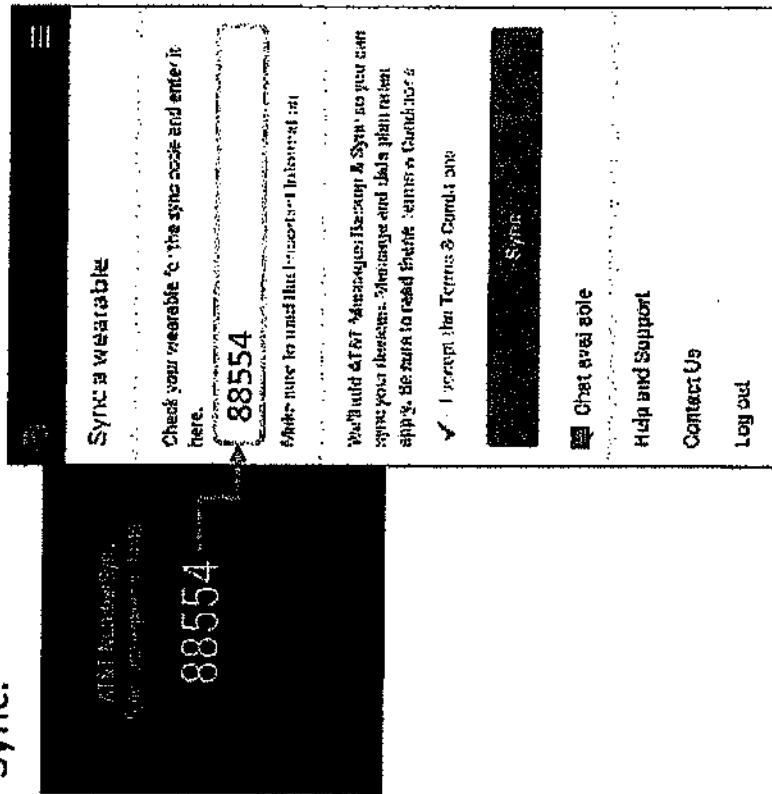
Ensure NumberSync is turned on and setup is complete!
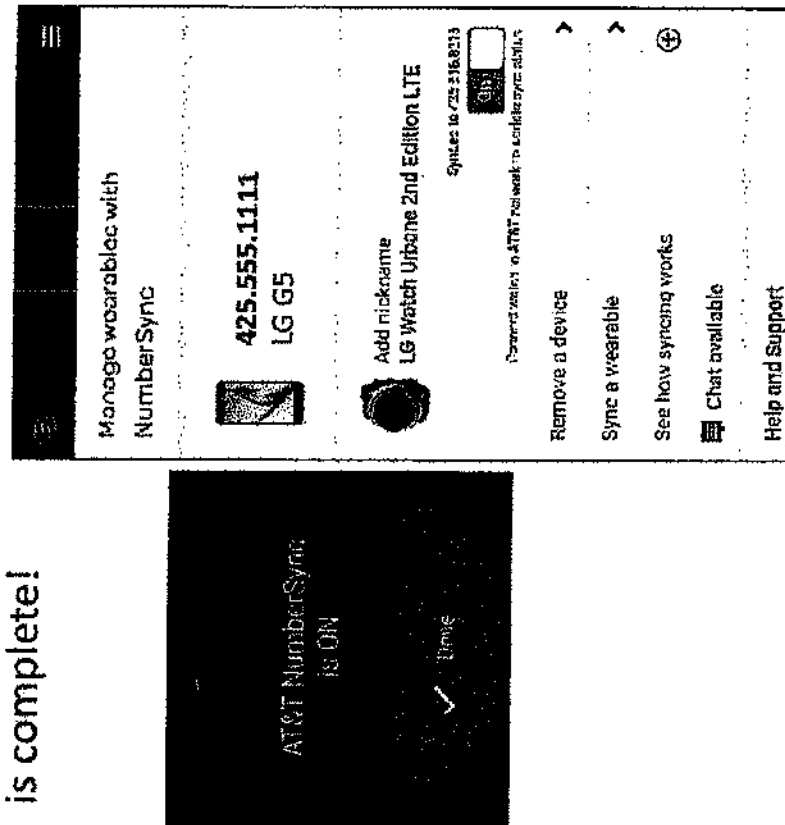
Before You Begin: Setting up NumberSync on Android tablets

- The NumberSync set up process is the same on all Android tablets. The UI may look different, but the steps are identical.

- It is easiest to set up NumberSync on demo smartphones and wearables first, then use those myAT&T accounts to set up Android tablets.

- **Ensure the tablets have all recent software updates installed.** (Settings > About Device > Software Update)
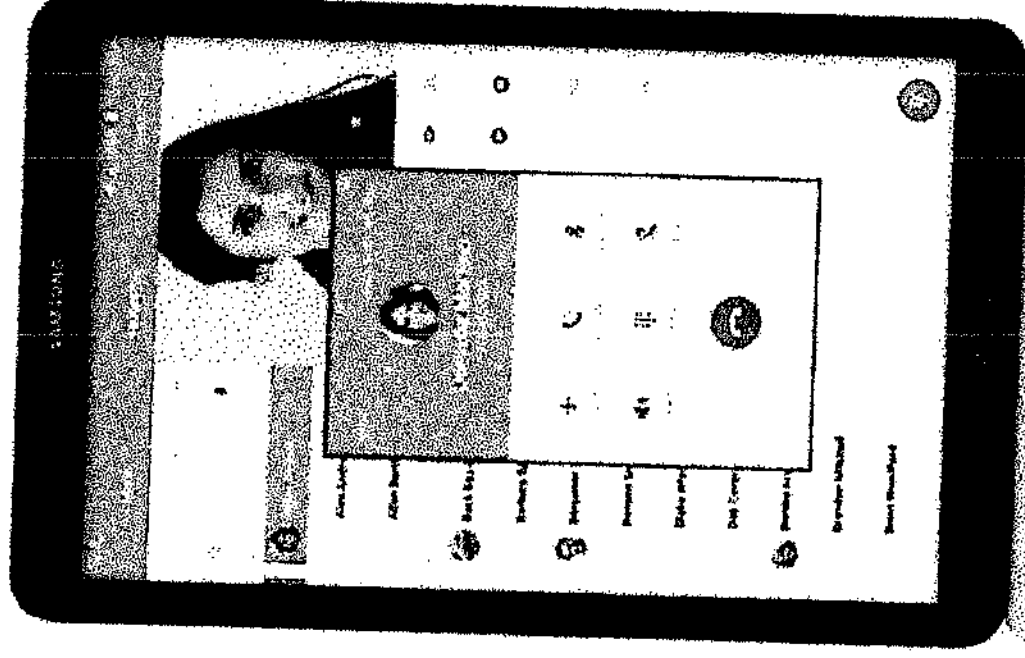
Adding AT&T Messages for Tablets

To enable messaging from an Android tablet:

- Tap the Messages icon (on the home screen or in the app tray)

- Log in with the myAT&T User ID/Password established earlier.

- The smartphone which the tablet will be paired with will receive a SMS with a PIN to complete the AT&T Messages log in.

- Once entered, set up is complete and messages will be delivered to both the smartphone and tablet.

AT&T Messages

Log in using your AT&T User ID · Don't have one? Sign Up

AT&T User ID

Password

Keep Me Logged In

Forgot AT&T User ID or Password?

Want to learn more? Click here

Send and receive texts from your tablet and computer!

With AT&T Messages, texting is a treat for phones and tablets. Keep the conversation going on your tablet or computer.

Learn More.
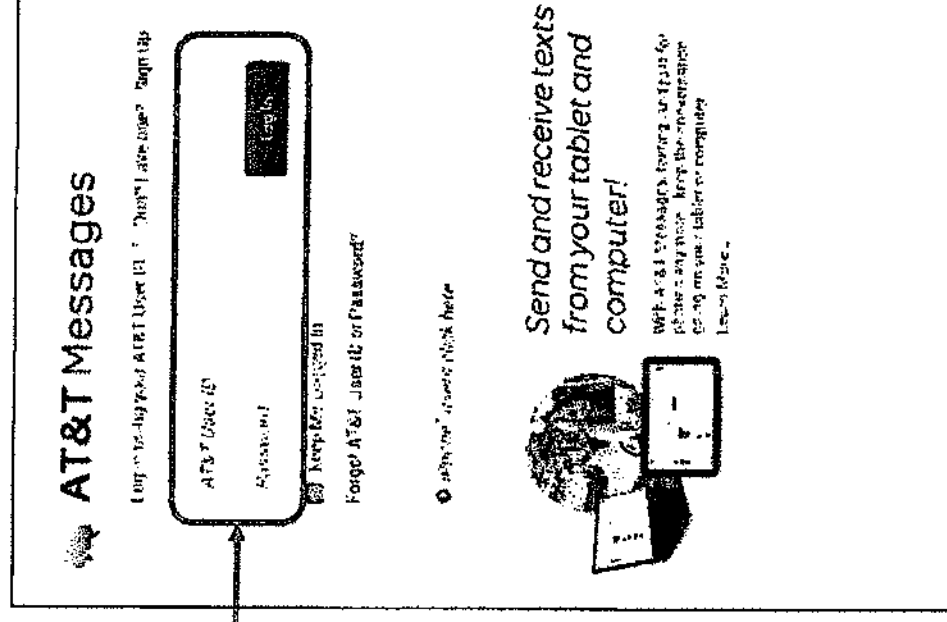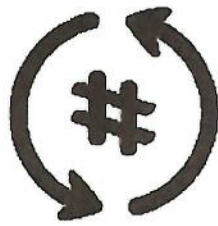
Set Up Guide: NumberSync for Android tablets

1. Start the set-up process by tapping on the **Phone** icon, found on the home screen or the Application Tray.

2. Review the NumberSync info and tap **Next.**

Pro Tip

If the Phone icon is not on the tablet home screen, manually place it there so customers can see it.

21

Set Up Guide: NumberSync for Android tablets

3. On the myAT&T login screen, enter the UserID and password for the **smartphone mobile number** you would like to sync with your tablet — **This should be the same log-in used to set up NumberSync with the LG Watch Urbane.**

NumberSync requires an AT&T UserID associated with the primary phone number that you want to sync.
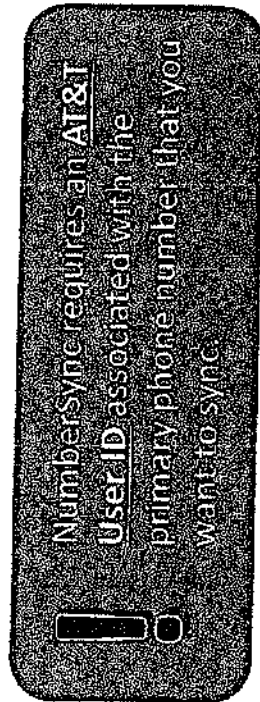
- If you have forgotten the UserID and password, tap on Forgot Password.

- If you have not established a UserID for the smartphone mobile number you wish to sync with your tablet, tap Register. You will be prompted for the last four digits of your smartphone's IMEI.
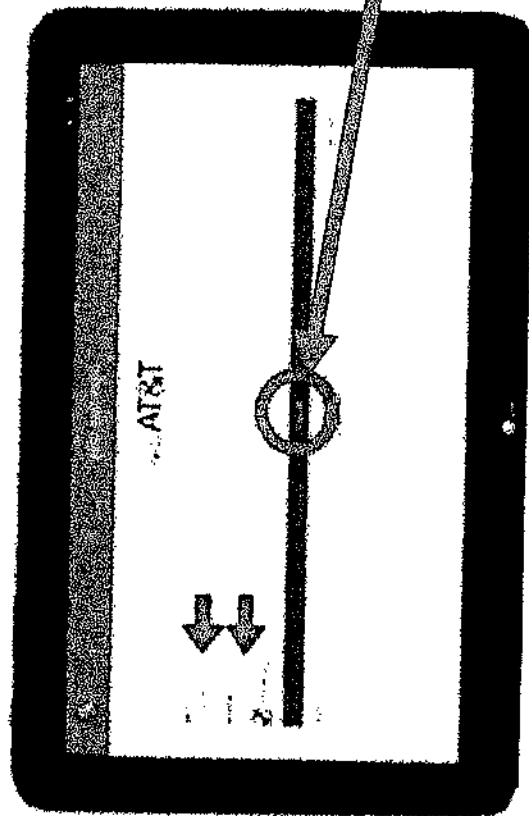
4. Tap **Continue.** You will receive a confirmation text on your smartphone.

AT&T

Set Up Guide: NumberSync for Android tablets

5. Read "Important Info" and then tap **Next.**
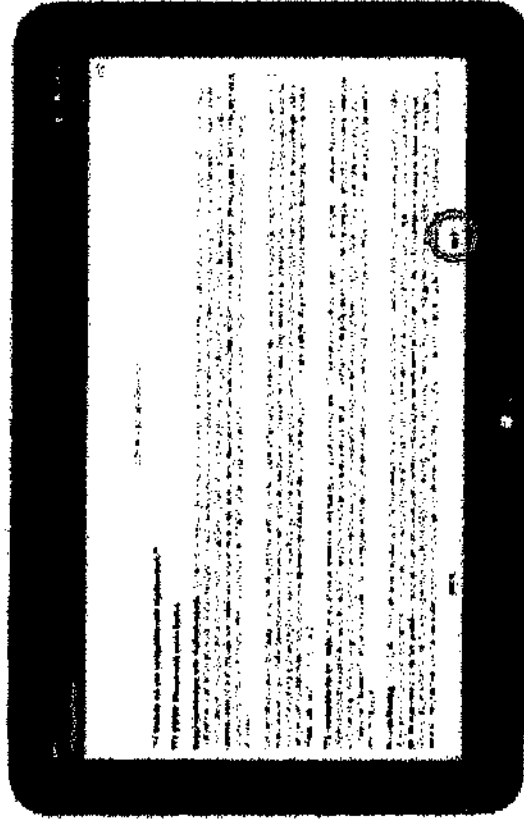
6. Enter your e911 address (the store's physical address) and tap **Verify Address.**
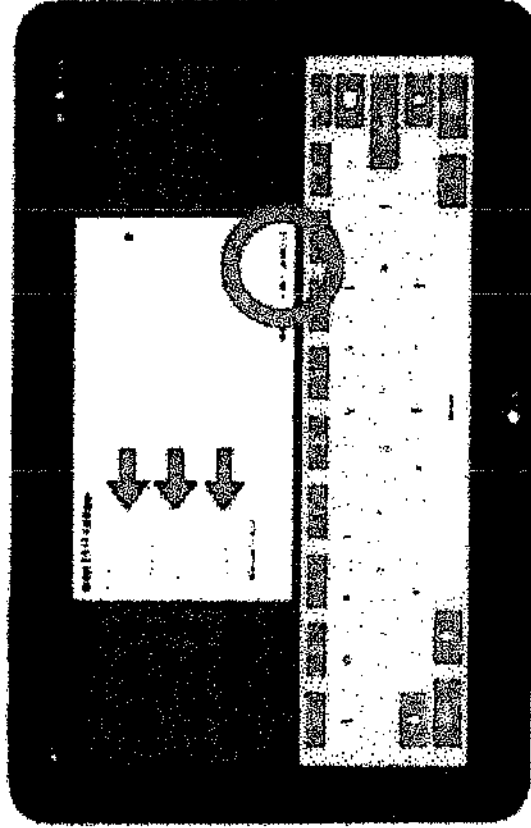
Set Up Guide: NumberSync for Android tablets

7. You can enter a **device name** (optional), then tap **Next** to log in.

When logged in, the NumberSync icon will display in the tablet's notification bar.

Set Up Guide: NumberSync for Android tablets

Set Up is complete! You can now answer incoming calls, and place NumberSync calls using the Phone icon on the Home Screen or Application Tray.

In addition, you can place NumberSync calls using the Phone and Video* icons in:

- Contacts
- Call log
- Phone numbers in email
- Phone numbers on web sites

*The Video icon will be greyed out when that option is not available.

Pro Tip

Tapping a phone number in email or on the web gives you the option to place a NumberSync voice (Phone icon) or video* (Camera icon) call.
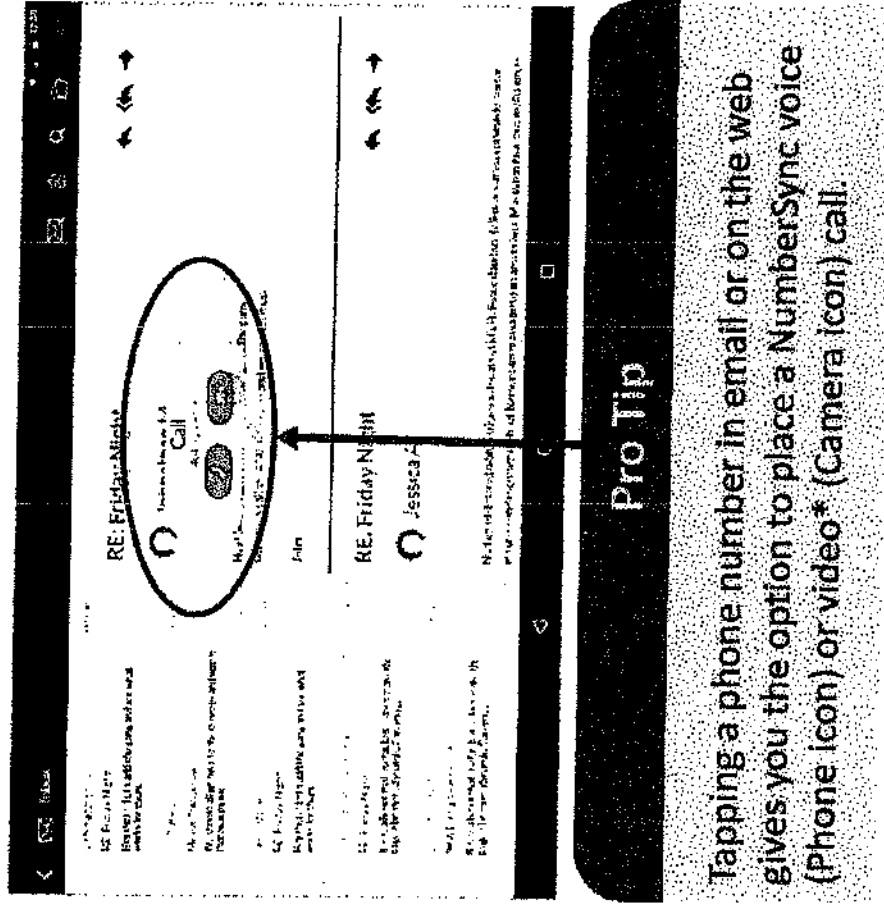
Demonstrating NumberSync

The power and convenience of NumberSync can be demonstrated with *one phone call.*

- Ensure displays in your store have been set up with NumberSync.

- Save the phone numbers to the NumberSync demo phones in your COU contacts.

- Demonstrate by making ONE phone call:
  - All synced phones will ring
  - Answer on whichever one is convenient

Expand your Demonstration

- Demonstrate Video Call at the same time, taking the call on the synced tablet.

- Show Bluetooth headsets that can be paired to both wearable and smartphone for added convenience.

- Remind customers that their NumberSync-capable devices are covered under their Device Protection Package.

Key Points to Know & Show

Key Points to Demonstrate

- When you call the NumberSync phone number, all synced devices ring.
  - Three devices — *One phone number!*
  - Easiest to show when all devices are displayed together.

- You can answer on whichever device is convenient.
- Emphasize that *you don't have to run across the room to answer a call!*
- Easiest to show when devices are not displayed together.

Key Points to Explain

- NumberSync lets you "link" your compatible devices to your phone number.

- Whoever you call will see YOUR phone number, regardless of which NumberSync device you call from.

- Even if your smartphone is left at home or turned off, NumberSync will still work on the rest of your synced devices.

- Tablets can take advantage of Wi-Fi for NumberSync in areas where a signal may be hard to get.
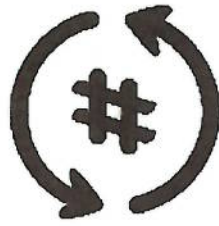
Personalize Your Demo

- While telling your customer about the benefits of NumberSync, start calling the demo phone number.

- Point out how, when you called one number, all of the synced devices rang!

- Answer the call on which ever device is convenient.

- Be sure to mention:
  - Current device promotions
  - Bluetooth headsets that connect to both phone & wearable

After the Demo

- You've told your customer about the benefits of NumberSync.

- They have or are buying an eligible smartphone and wearable/tablet.

- You have verified that they do not use Smart Limits or other conflicting features (see myCSP for a list of conflicts).

Next:

- Help the customer set up NumberSync following the steps reviewed here.

- If your customer does not have an AT&T User ID & Password, help them set one up.

- Ensure NumberSync calls ring on all devices before your customer leaves the store.

EXHIBIT D
US PATENT 9,438,728

US009438728B2

(12) United States Patent
Schei et al.

(10) Patent No.: **US 9,438,728 B2**
(45) Date of Patent: **Sep. 6, 2016**

(54) **TELEPHONE NUMBER GROUPING SERVICE FOR TELEPHONE SERVICE PROVIDERS**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: 14/525,039

(22) Filed: **Oct. 27, 2014**

(65) **Prior Publication Data**

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H04M 3/42 (2006.01)

(52) **U.S. Cl.**
CPC *H04M 3/4228* (2013.01); *H04M 3/42212* (2013.01)

(58) **Field of Classification Search**
None
See application file for complete search history.

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(74) *Attorney, Agent, or Firm* — Kilpatrick Townsend & Stockton LLP

(57) **ABSTRACT**

An existing telephone service provider network may be adapted to associate a single telephone number with multiple telephone service user devices. The multiple provisioned telephone numbers may be grouped such that service activity originating from a device associated with one of the grouped telephone numbers appears to originate from a selected (and possibly different) one of the grouped telephone numbers, and such that service activity destined for a device associated with one of the grouped telephone numbers may be forwarded to one or more and/or each of the devices associated with the grouped telephone numbers. Any suitable set of provisioned telephone numbers may be grouped including, but not limited to, a set of two provisioned telephone numbers.

20 Claims, 8 Drawing Sheets

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110

114 | Grouped Devices

Comm. Device

Comm. Device

108

Comm. Device

106

Public Telephone Network

112

102

Comm. Device

104

Comm. Device

100

Figure 1

Figure 2

		Telephone Service Provider Interface 312
GUI(s) 306	User Interface(s) 304	

Telephone Service Activity Handling 314

Group Inbound Activity Handling 320

Group Outbound Activity Handling 322

Emergency Activity Handling 324

User Datastore 308

Activity Handling Rule Datastore 318

Registered Device Datastore 310

Activity Handling Rule Configuration 316

Telephone Number Grouping Service

Telephone Number Group Identification Service 326

302

Figure 3

Figure 4

Figure 5

Figure 6

Register Telephone
Numbers as Grouped

702

Receive Indication of
Group

704

Receive Indication of
Activity Processing
Policy

706

Request Delegation of
Activity Processing for
Group

708

Receive Delegation of
Activity Processing for
Group

710

Identify Group

712

Determine Processing
Policy for Group

714

Process Service
Activity In Accordance
With Policy

716

Figure 7

I/O Controller
814

Display Adapter
812

Monitor
810

Memory
822

Serial Port
816

Processor(s)
820

Keyboard
806

Printer
804

Fixed Disk
808

External Interface
818

802

800

Figure 8

TELEPHONE NUMBER GROUPING SERVICE FOR TELEPHONE SERVICE PROVIDERS

TECHNICAL FIELD

This invention pertains generally to telecommunications and, more particularly, to telecommunications that uses telephone numbers.

BACKGROUND

Mobile telephones have become a common part of work and play, enabling convenient real-time and message-style communications between billions of people. As they developed, mobile telephone systems typically extended fixed or landline telephone systems, with a unifying element being a telephone number that conceptually corresponds to a particular telephone. As mobile telephones have become dominant in the marketplace, the traditional association betw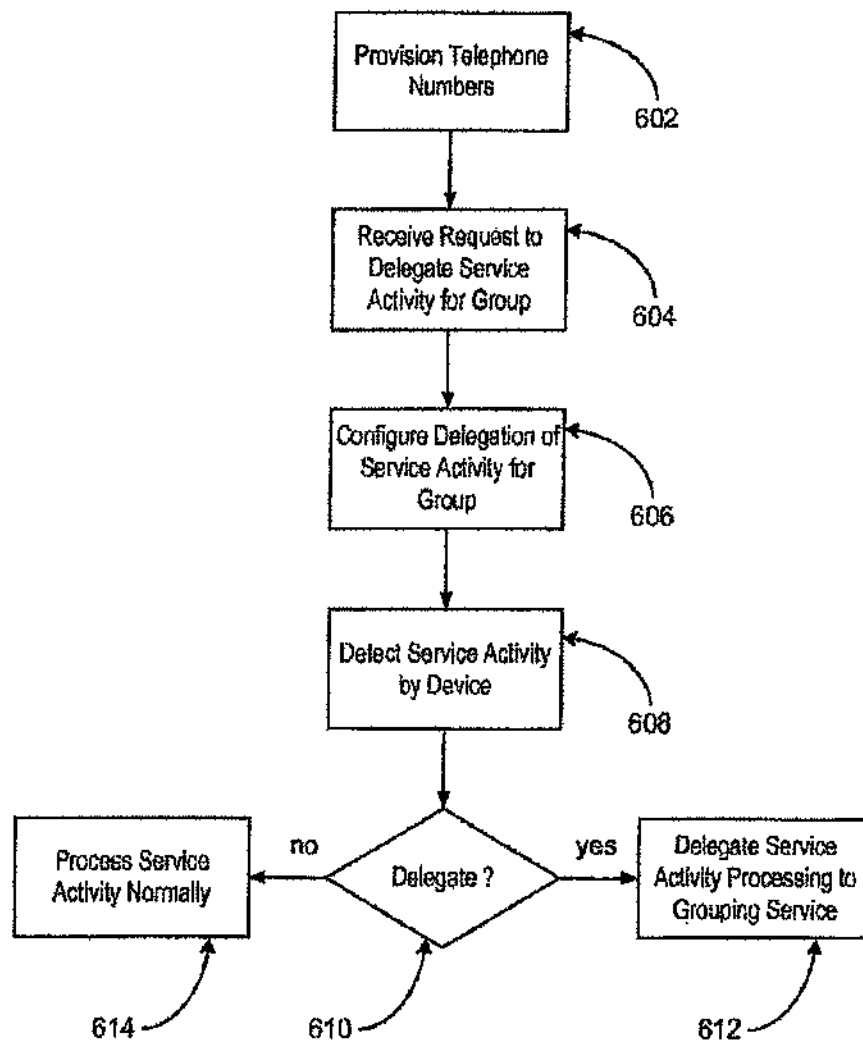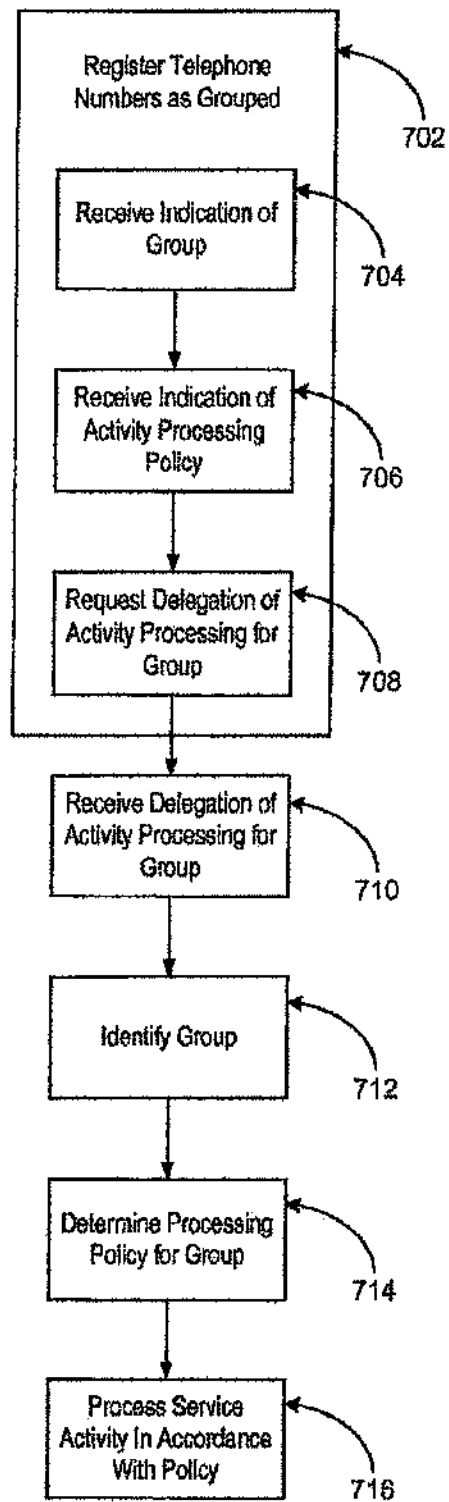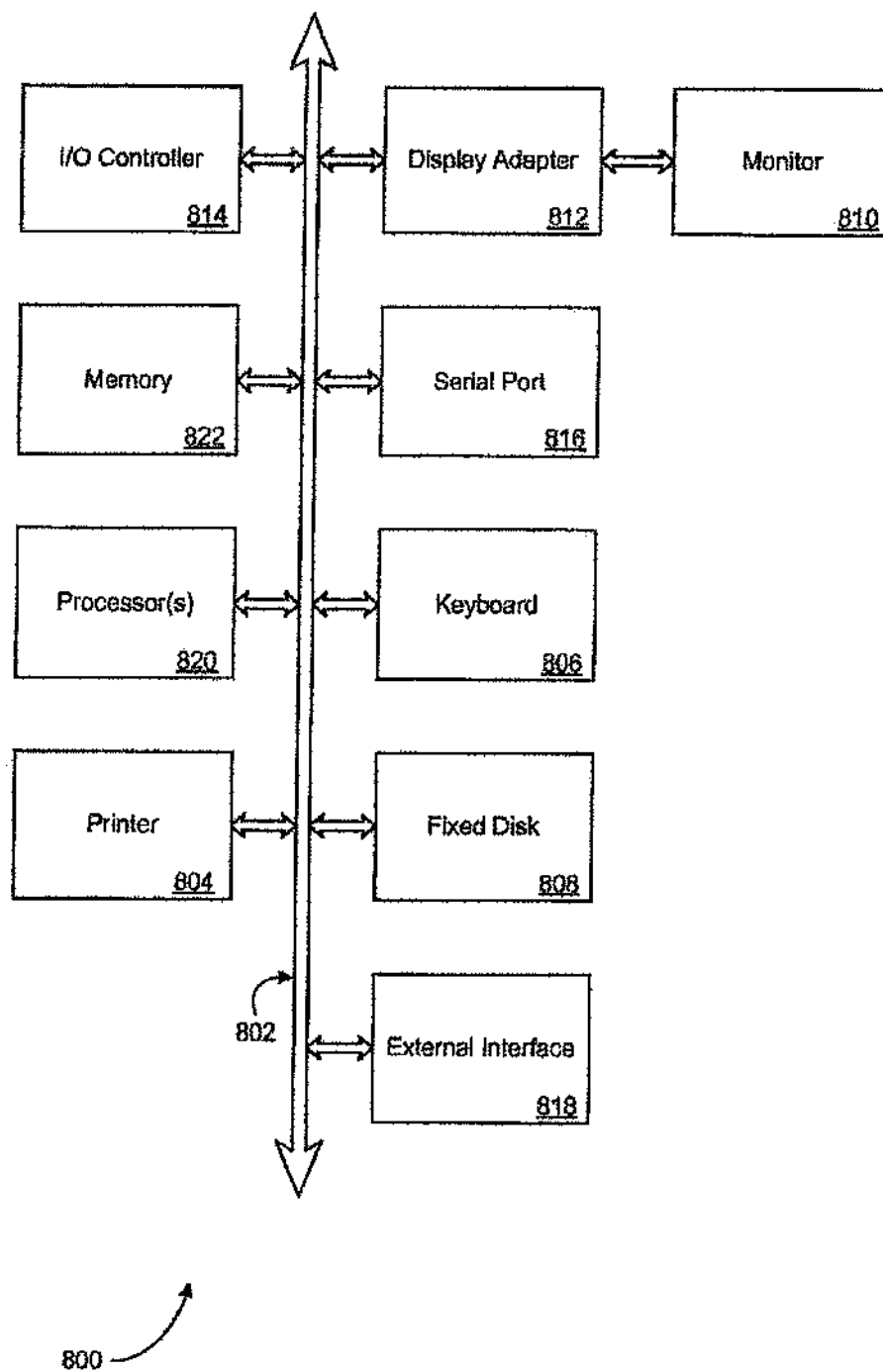een particular telephone numbers and particular physical locations has weakened, while the association between particular telephone numbers and particular people has strengthened. Mobile telephones have become lightweight and capable of being carried or in close proximity for much of the time. It can even feel odd to call a telephone number and have the call answered by someone other than a particular person associated with the telephone number.

In addition, the variety of mobile communication devices has exploded. From smart phones to wearables, telephone numbers are being associated with more and more non-traditional devices. In particular, it is becoming more common for a person to possess and operate multiple mobile communication devices, each with features and shortcomings, and each with its own associated telephone number. However, this situation introduces the confusion of multiple telephone numbers associated with a person, and the frustration that the person may not have all of the multiple devices in close proximity all the time.

Conventional attempts to address such frustrations, confusions and complexities are inefficient, ineffective and/or have undesirable side effects or other drawbacks with respect to at least one significant use case. For example, some conventional approaches are poorly integrated with telephone service provider infrastructure.

Embodiments of the invention are directed toward solving these and other problems individually and collectively.

BRIEF DESCRIPTION OF THE DRAWINGS

Illustrative embodiments of the present invention are described in detail below with reference to the following drawing figures:

FIG. 1 is a schematic diagram depicting aspects of an example telecommunications environment in accordance with at least one embodiment of the invention;

FIG. 2 is a schematic diagram depicting aspects of an example system architecture in accordance with at least one embodiment of the invention;

FIG. 3 is a schematic diagram depicting aspects of an example telephone number grouping service in accordance with at least one embodiment of the invention;

FIG. 4 is a schematic depicting aspects of an example telephony protocol modification in accordance with at least one embodiment of the invention;

FIG. 5 is a schematic diagram depicting aspects of another example telephony protocol modification in accordance with at least one embodiment of the invention;

FIG. 6 is a flowchart depicting example steps for providing a telephone number grouping service in accordance with at least one embodiment of the invention;

FIG. 7 is a flowchart depicting further example steps for providing a telephone number grouping service in accordance with at least one embodiment of the invention; and

FIG. 8 is a schematic diagram depicting aspects of an example computing device in accordance with at least one embodiment of the invention.

Note that the same numbers are used throughout the disclosure and figures to reference like components and features.

DETAILED DESCRIPTION

The subject matter of embodiments of the present invention is described here with specificity to meet statutory requirements, but this description is not necessarily intended to limit the scope of the claims. The claimed subject matter may be embodied in other ways, may include different elements or steps, and may be used in conjunction with other existing or future technologies. This description should not be interpreted as implying any particular order or arrangement among or between various steps or elements except when the order of individual steps or arrangement of elements is explicitly described.

In accordance with at least one embodiment of the invention, a telephone number grouping service may be provided for telephone service providers. An existing telephone service provider network may provide telephone service to a variety of communication devices associated with telephone numbers ("telephone service user devices") including landline telephones and wireless cellular telephones. The existing telephone service provider network may be adapted to associate a single telephone number with multiple telephone numbers and/or multiple telephone service user devices.

In accordance with at least one embodiment of the invention, a telephone service provider may provision telephone numbers for multiple telephone service user devices. For example, such provisioning may include associating particular telephone numbers with particular subscriber identity module (SIM) of a wireless cellular telephone. The multiple provisioned telephone numbers may be grouped such that service activity originating from a device associated with one of the grouped telephone numbers ("outgoing activity") appears to originate from a selected (and possibly different) one of the grouped telephone numbers, and such that service activity destined for a device associated with one of the grouped telephone numbers ("incoming activity") may be forwarded to one or more and/or each of the devices associated with the grouped telephone numbers. For example, incoming telephone calls may be forked to multiple devices and outgoing telephone calls may be masked so as to appear to originate from a selected and/or primary one of the grouped telephone numbers. In accordance with at least one embodiment of the invention, a new telephone number may be provisioned and grouped with other telephone numbers to act as the primary telephone number for the group. Any suitable set of provisioned telephone numbers may be grouped including, but not limited to, a set of two provisioned telephone numbers.

In accordance with at least one embodiment of the invention, provisioned telephone numbers may be grouped in a registration phase. For example, the registration phase may

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be facilitated with a graphical user interface such as a smart phone "app" or web site. A grouping service may intercept telephone service activity associated with registered telephone numbers. For example, the telephone service provider may at least partially delegate telephone service control to the grouping service. The grouping service may process intercepted telephone service activity in accordance with one or more configured service activity processing policies, and may yield service activity control on detection of emergency situations and/or conditions (e.g., a "911" call). The grouping service may be implemented with one or more components including one or more components located in a telephone service provider network (e.g., by a telecommunications switch), one or more components independent of telephone service provider networks (e.g., at "cloud" hosted servers), and/or one or more components on a telephone service user device (e.g., smart phone apps and/or lower-level telephone network functionality).

Having introduced some salient concepts, the description now turns to the figures. FIG. 1 depicts aspects of an example telecommunications environment 100 in accordance with at least one embodiment of the invention. In the example telecommunications environment 100, multiple telephone service user devices 102, 104, 106, 108, 110 are connected by a public telephone network 112 operated by one or more telephone service providers (not shown in FIG. 1). For example, telephone service user devices may include a landline telephone 102, a wireless cellular telephone 106, a smart phone 104, a wearable communications device 110 and any suitable communications device capable of participating in the public telephone network 112. In the example depicted in FIG. 1, a mobile telephone 108 and the wearable communications device 110 have been configured as grouped devices 114 in accordance with at least one embodiment of the invention.

FIG. 2 depicts aspects of an example system architecture 200 in accordance with at least one embodiment of the invention. The example system architecture 200 includes a public telephone service provider 202 operating multiple telecommunication switches 204, 206, 208 connected by an internal network 210. The telecommunication switches 204, 206, 208 may implement any suitable telephony protocol including a plain old telephone service (e.g., POTS), a global system for mobile communications (e.g., GSM), and a code division multiple access (CDMA) based telephony protocol. The provider internal network 210 may include any suitable networking component including switches, routers, gateways, and wired and wireless communication connections of any suitable type. The public telephone service provider 202 may provision telephone numbers for suitable telephone service user devices 102, 104, 106, 108, 110 (FIG. 1), for example, utilizing telecommunication switch 204, 206, 208 resources.

The system architecture 200 may further include a grouping service 212 configured at least to provide a telephone number grouping service for the public telephone service provider 202. An example grouping service in accordance with at least one embodiment of the invention is described below in more detail with reference to FIG. 3. In this example system architecture 200, the grouping service 212 is incorporated into the public telephone service provider 202, however each embodiment is not so limited. The grouping service 212 may be accessible from a user client 214 (e.g., a personal computer) via a public internetwork 216 (e.g., the Internet). For example, the grouping service 212 may maintain a web-based user interface for registering and configuring grouped telephone numbers and/or user

4

devices, and the user client 214 may incorporate a web client (e.g., a web browser) suitable for interacting with the web-based user interface.

FIG. 3 depicts aspects of an example telephone number grouping service 302 in accordance with at least one embodiment of the invention. The telephone number grouping service 302 of FIG. 3 is an example of the grouping service 212 of FIG. 2. The telephone number grouping service 302 of FIG. 3 may include one or more user interfaces 304 suitable for registering and configuring grouped telephone numbers. The user interface(s) 304 may include any suitable user interfaces including one or more interactive voice response (IVR) user interfaces, one or more graphical user interfaces 306 and/or one or more programmatic user interfaces such as one or more application programming interfaces (APIs). grouping service users may utilize suitable telephone service user devices 102, 104, 106, 108, 110 (FIG. 1) and/or other suitable user clients 214 (FIG. 2) to interact with the user interface(s) 304. The user interface(s) 304 may provide access to any suitable functionality of the telephone number grouping service 302, including administrative level access to authorized users.

Service 302 user details and preferences may be stored in a user datastore 308. Registered telephone service user device 102, 104, 106, 108, 110 (FIG. 1) details, including associated telephone numbers, may be stored in a registered device datastore 310. The telephone number grouping service 302 may include a telephone service provider interface 312 enabling access to public telephone service provider 202 (FIG. 2) functionality and/or enabling the public telephone service provider 202 to delegate telephone service activity processing to the telephone number grouping service 302. For example, responsive to registration of a group of telephone numbers, the telephone number grouping service 302 may utilize the telephone service provider interface 312 to request delegation of telephone service activity related to the telephone numbers in the group. Such delegation may include interception and/or forwarding of telephone calls and/or short message service (SMS) messages, and/or delegation of responsibility for aspects of related telephony protocols such as telephony protocol signals or messages. Where a telephone service activity includes distinct service activity control and service activity data aspects, delegation may include delegation of service activity control and/or service activity data. Such delegation may include providing, receiving, routing, transforming and/or processing service activity control and/or service activity data.

Upon receiving delegated telephone service activity, the telephone number grouping service 302 may process the delegated telephone service activity with a telephone service activity handling module 314. For example, the public telephone service provider 202 (FIG. 2) may forward a call destined for a grouped telephone number to the telephone service provider interface 312, and the telephone service activity handling module 314 may process the call in accordance with one or more telephone service activity processing policies. In accordance with at least one embodiment of the invention, telephone service activity processing policies may be at least partially implemented utilizing a rules engine interpreting, processing and/or executing one or more activity handling rules. Such rules may be configured responsive to user selection, for example, by an activity handling rule configuration module 316, and stored in an activity handling rule datastore 318. Activity handling rules may be of any suitable type, including statements of an interpreted or compiled computer programming language. Activity handling rules may specify any suitable telephony protocol

state, action and/or parameter, and/or modifications thereof. The telephone service activity handling module 314 may include one or more sub-modules for handling particular types of telephone service activity such as the inbound telephone service activity handling module 320, the outbound telephone service activity handling module 322, and the emergency telephone service activity module 324.

The activity handling rule configuration module 316 may determine sets of one or more rules that implement telephone service activity handling policies including grouped telephone number call policies such as grouped telephone number incoming call policies and grouped telephone number outgoing call policies and similar policies for other types of telephone service activity such as SMS messaging. The telephone number grouping service 302 may incorporate default and/or "hardcoded" telephone service activity handling policies. Alternatively, or in addition, telephone service activity handling policies may be specified and/or customized with one or more user interfaces 304 by a service user and/or administrator. An ordinary service user may customize policies with limited applicability to registered telephone numbers and/or telephone service user devices associated with the user and/or a user group for which the user is authorized to customize policies. A system administrator may create, read, update and delete policies that are applicable to all service 302 users.

For example, a grouped telephone number call policy may specify one or more aspects of telephone number grouping service 302 behavior with respect to telephone calls to or from telephone service user devices associated with grouped telephone numbers. Such policies may control user experience with respect to use of the telephone number grouping service 302. One or more telephone service user devices may be associated with a group of telephone numbers, and a grouped telephone number incoming call policy may specify which of the group of telephone numbers are activated responsive to an incoming call (e.g., are dialed in preparation for participating in the call). Associated telephone service user devices may be activated simultaneously or in a specified order. A grouped telephone number outgoing call policy may specify which of the group of telephone numbers is designated as primary for the group. Calls from any of the telephone service user devices associated with the group may be modified such that the calls appear to originate from the designated primary telephone number of the group. For example, associated "Caller ID" data may be modified to match the designated primary telephone number of the group.

The telephone number grouping service 302 may include a telephone number group identification service 326. The telephone number group identification service 326 may be configured at least to determine one or more telephone number groups with which a particular telephone number and/or registered telephone service user device is associated. For example, a telephone number group data object (e.g., a data object characterizing a telephone number group for programmatic purposes) may include and/or reference a telephone number group identifier, a collection of telephone numbers that are members of the telephone number group and one or more representative telephone numbers (sometimes called "primary" telephone numbers herein) that publically represent the telephone number group in the public telephone network 112 (FIG. 1).

The telephone number group identification service 326 may be utilized by any suitable component of the telephone number grouping service 302 including the user interface(s) 304, the telephone service provider interface 312, the tele-

phone service activity handling component 314 and the activity handling rule configuration component 316. For example, the telephone service activity handling component 314 may provide the telephone number group identification service 326 with a telephone number associated with inbound and/or outbound telephone service activity and receive a telephone group identifier and/or a group representative telephone number in response. Alternatively, or in addition, the telephone number group identification service 326 may be accessed directly by components external to the telephone number grouping service 302, for example, as part of third party integration of applications and/or services utilizing the telephone number groups maintained by the telephone number grouping service 302. The telephone number group identification service 326 may base the determination on data stored in the user datastore 308 and/or the registered device datastore 310.

FIG. 4 depicts aspects of an example telephony protocol modification 400 in accordance with at least one embodiment of the invention. For example, the telephony protocol modification 400 may be performed by inbound telephone service activity handling module 320 (FIG. 3). A public telephone service provider 402, telecommunication switches 404, 406, 408, provider internal network 410, and grouping service 412 are examples of corresponding components depicted in FIG. 2. Telephone service user device 414 and grouped 416 telephone service user devices 418, 420 are examples of corresponding components depicted in FIG. 1.

In the example depicted in FIG. 4, the devices 420, 418, having telephone numbers y and z, respectively, are registered as grouped devices 416 having primary telephone number x. Primary telephone number x may be a separately provisioned telephone number (e.g., responsive to group registration), or the user may have selected one of telephone numbers y and z to be the primary telephone number (e.g., with user interface(s) 304 of FIG. 3). Device 414 dials primary telephone number x. Public telephone service provider 402 recognizes telephone number x as configured for delegation to the grouping service 412, and forwards the call to the grouping service 412. In response, the grouping service 412 forks the call into two new calls destined for telephone numbers y and z. Answering the call with device 420 or 418 begins the call. During the call, the grouping service 412 may act as a call bridge. Alternatively, or in addition, the grouping service 412 may return call control to the public telephone service provider 402 once the call is established.

FIG. 5 depicts aspects of another example telephony protocol modification 500 in accordance with at least one embodiment of the invention. For example, the telephony protocol modification 500 may be performed by outbound telephone service activity handling module 322 (FIG. 3). A public telephone service provider 502, telecommunication switches 504, 506, 508, provider internal network 510, and grouping service 512 are examples of corresponding components depicted in FIG. 2. Telephone service user device 514 and grouped 516 telephone service user devices 518, 520 are examples of corresponding components depicted in FIG. 1.

In the example depicted in FIG. 5, the devices 520, 518, having telephone numbers a and b, respectively, are registered as grouped devices 516 having primary telephone number a. Device 518 originates a call to telephone number c, associated with telephone service user device 514. At this point, the call appears to originate at telephone number b. Public telephone service provider 502 recognizes telephone number b as configured for delegation to the grouping

service 512, and forwards the call to the grouping service 512. In response, the grouping service 512 forwards the call to telephone number c, but modifies data associated with the call so that the call appears to originate at the designated primary telephone number a.

Having described aspects of suitable telecommunication environments and system architectures, the description now turns to procedures that may be performed therewith. FIG. 6 depicts example steps for providing a telephone number grouping service in accordance with at least one embodiment of the invention. At step 602, one or more telephone numbers may be provisioned, for example, by the public telephone service provider 202 (FIG. 2). At step 604, a request may be received to delegate service activity for a group of telephone numbers. For example, the request may be received from the grouping service 212 responsive to user registration of the group of telephone numbers. At step 606, the requested delegation may be configured. For example, a suitable telecommunication switch 204, 206, 208 may be configured to delegate service activity with respect to telephone numbers in the group of telephone numbers to the grouping service 212.

At step 608, service activity by a telephone service user device may be detected. For example, a telecommunication switch 204, 206, 208 (FIG. 2) may detect an incoming call. At step 610 it may be determined whether the service activity is associated with a telephone number configured for delegation to the grouping service. If so, a procedure including step 610 may progress to step 612. Otherwise, the procedure may progress to step 614. At step 612, service activity processing for the detected service activity may be delegated to the grouping service 212. For example, the incoming call may be forwarded to the grouping service 212. At step 614, the service activity may be processed as normal and/or usual, for example, by the public telephone service provider 202. At times, a procedure performing step 612 may progress to step 614 to resume normal service activity processing. Alternatively, or in addition, service activity processing control may remain delegated for the lifetime of the service activity.

FIG. 7 depicts further example steps for providing a telephone number grouping service in accordance with at least one embodiment of the invention. At step 702, two or more telephone numbers may be registered as grouped, for example, with the telephone number grouping service 302 (FIG. 3). Step 702 may itself include one or more steps. For example, steps 704, 706, 708. At step 704, an indication of a group of telephone numbers may be received. For example, the telephone number grouping service 302 may receive a specification of the group of telephone numbers with the user interface(s) 304. At step 706, an indication of a service activity processing policy may be received. For example, the telephone number grouping service 302 may receive an indication of a preferred service activity processing policy with the user interface(s) 304. At step 708, delegation of service activity processing related to telephone numbers in the group may be requested. For example, the telephone number grouping service 302 may request the delegation with the telephone service provider interface 312.

At step 710, delegation of service activity processing related to telephone numbers in the group may be received, for example, with the telephone service provider interface 312 (FIG. 3). At step 712, the group may be identified, for example, by the telephone service activity handling module 314 and/or the telephone number group identification service 326. The identity of the telephone number group may correspond to a representative group telephone number

and/or an explicit telephone number group identifier having any suitable form. At step 714, one or more processing policies for the delegated service activity may be determined. For example, the telephone service activity handling module 314 may determine the appropriate policies based at least in part on the identified group (e.g., different policies may be configured for different groups). At step 716, the delegated service activity may be processed in accordance with the determined policy or policies. For example, the telephone service activity handling module 314 may identify and execute a set of rules in the activity handling rule datastore 318 corresponding to the determined policy or policies.

In accordance with at least one embodiment of the invention, the system, apparatus, methods, processes and/or operations described above may be wholly or partially implemented in the form of a set of instructions executed by one or more programmed computer processors such as a central processing unit (CPU) or microprocessor. Such processors may be incorporated in an apparatus, server, client or other computing device operated by, or in communication with, other components of the system. As an example, FIG. 8 depicts aspects of elements that may be present in a computing device and/or system 800 configured to implement a method and/or process in accordance with some embodiments of the present invention. The subsystems shown in FIG. 8 are interconnected via a system bus 802. Additional subsystems include a printer 804, a keyboard 806, a fixed disk 808, and a monitor 810, which is coupled to a display adapter 812. Peripherals and input/output (I/O) devices, which couple to an I/O controller 814, can be connected to the computer system with any number of means known in the art, such as a serial port 816. For example, the serial port 816 or an external interface 818 can be utilized to connect the computing device 800 to further devices and/or systems not shown in FIG. 8 including a wide area network such as the Internet, a mouse input device, and/or a scanner. The interconnection via the system bus 802 allows one or more processors 820 to communicate with each subsystem and to control the execution of instructions that may be stored in a system memory 822 and/or the fixed disk 808, as well as the exchange of information between subsystems. The system memory 822 and/or the fixed disk 808 may embody a tangible, non-transitory computer-readable medium.

Example embodiments in accordance with the invention include the following.

Example 1, a method for telephone number grouping, including: provisioning, by a telephone service provider, a plurality of telephone numbers including associating each of the plurality of telephone numbers with a particular telephone service user device of a plurality of telephone service user devices; registering, with a telephone number grouping service, at least two telephone numbers of the plurality of telephone numbers as grouped telephone numbers with respect to incoming and outgoing telephone calls; providing, by the telephone service provider to the telephone number grouping service, at least partial call control for incoming and outgoing telephone calls with respect to the grouped telephone numbers; with respect to incoming telephone calls, activating one or more of the plurality of telephone service user devices associated with the grouped telephone numbers in accordance with a user-configured grouped telephone number incoming call policy; and with respect to an outgoing telephone call from a telephone service user device associated with the grouped telephone numbers, causing the outgoing telephone call to appear to originate

from a selected telephone number of the grouped telephone numbers in accordance with a user-configured grouped telephone number outgoing call policy.

Example 2, a method in accordance with example 1, wherein the telephone service provider comprises the telephone number grouping service. Example 3, a method in accordance with example 1 or 2, wherein each provisioned telephone number is associated with a subscriber identity module (SIM). Example 4, a method in accordance with example 1-2 or 3, wherein the grouped telephone number incoming call policy or the grouped telephone number outgoing call policy is user-configured. Example 5, a method in accordance with example 1-3 or 4, wherein the telephone service provider is one of a plurality of telephone service providers that provision telephone numbers. Example 6, a method in accordance with example 1-4 or 5, wherein the grouped telephone number incoming call policy specifies at least that each of the telephone service user devices associated with the grouped telephone numbers is simultaneously activated in response to an incoming telephone call with respect to any of the grouped telephone numbers. Example 7, a method in accordance with example 1-5 or 6, wherein the telephone number grouping service causes the telephone service provider to provision an additional telephone number associated with the grouped telephone numbers and distinct from each of the at least two registered telephone numbers.

Example 8, a method for telephone service activity processing, including: registering at least two telephone numbers of a plurality of telephone numbers as grouped telephone numbers, the plurality of telephone numbers having been provisioned by a telephone service provider; receiving, from the telephone service provider, at least partial service control for telephone service activity with respect to the grouped telephone numbers; and processing the telephone service activity in accordance with a grouped telephone number call policy such that outgoing service activity appears to originate from a single telephone number and incoming service activity is forwarded to one or more associated telephone service user devices independent of a specified number of the grouped telephone numbers.

Example 9, a method in accordance with example 8, wherein the telephone service activity comprises one or more of: a telephone call, or a short message service (SMS) message. Example 10, a method in accordance with example 8 or 9, wherein receiving at least partial service control comprises one or more of: being delegated responsibility for one or more aspects of a telephony protocol with respect to the telephone service activity, being enabled to modify one or more aspects of a telephony protocol with respect to the telephone service activity, or becoming a service proxy with respect to the telephone service activity.

Example 11, a method in accordance with example 8-9 or 10, wherein receiving at least partial service control comprises one or more of: intercepting a telephone call destined for one or more of the grouped telephone numbers, being forwarded a telephone call destined for one or more of the grouped telephone numbers, intercepting a telephone call originated by one or more of the grouped telephone numbers, being forwarded a telephone call originated by one or more of the grouped telephone numbers. Example 12, a method in accordance with example 8-10 or 11, wherein receiving at least partial service control comprises one or more of: intercepting a short message service (SMS) message destined for one or more of the grouped telephone numbers, being forwarded an SMS message destined for one or more of the grouped telephone numbers, intercepting an

SMS message originated by one or more of the grouped telephone numbers, being forwarded an SMS message originated by one or more of the grouped telephone numbers. Example 13, a method in accordance with example 8-11 or 12, wherein processing the telephone service activity comprises one or more of: performing one or more aspects of a telephony protocol with respect to the telephone service activity, modifying one or more aspects of a telephony protocol with respect to the telephone service activity, acting as a service proxy with respect to the telephone service activity, or causing one or more telephone service user devices associated with the grouped telephone numbers to be signaled in accordance with a telephony protocol.

Example 14, a method in accordance with example 8-12 or 13, wherein processing the telephone service activity comprises one or more of: causing a telephone call to be forwarded to one or more telephone service user devices associated with the grouped telephone numbers, or causing a telephone call to be forwarded to each telephone service user device associated with the grouped telephone numbers. Example 15, a method in accordance with example 8-13 or 14, wherein processing the telephone service activity comprises one or more of: causing a short message service (SMS) message to be forwarded to one or more telephone service user devices associated with the grouped telephone numbers, or causing an SMS message to be forwarded to each telephone service user device associated with the grouped telephone numbers. Example 16, a method in accordance with example 8-14 or 15, wherein receiving at least partial service control for the telephone service activity comprises receiving at least partial service control for a telephone call originating from a first telephone number of the grouped telephone numbers and processing the telephone call comprises modifying data associated with the telephone call to cause the telephone call to appear to originate from a second telephone number of the grouped telephone numbers.

Example 17, a system for telephone service activity processing, including: a user interface component configured at least to register at least two telephone numbers of a plurality of telephone numbers as grouped telephone numbers, the plurality of telephone numbers having been provisioned by a telephone service provider; a telephone service provider interface component configured at least to receive, from the telephone service provider, at least partial service control for telephone service activity with respect to the grouped telephone numbers; and a telephone service activity handling component configured at least to process the telephone service activity in accordance with a grouped telephone number call policy such that outgoing service activity appears to originate from a single telephone number and incoming service activity is forwarded to one or more associated telephone service user devices independent of a specified number of the grouped telephone numbers.

Example 18, a system in accordance with example 17, wherein the telephone service provider interface component is communicatively coupled with a telecommunications switch of the telephone service provider. Example 19, a system in accordance with example 17 or 18, wherein the user interface component maintains a graphical user interface configured at least to enable users of the system to specify the at least two telephone numbers to be registered as the grouped telephone numbers. Example 20, a system in accordance with example 17-18 or 19, wherein the user interface component maintains a graphical user interface

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configured at least to enable users of the system to specify the grouped telephone number call policy for the grouped telephone numbers.

All references, including publications, patent applications, and patents, cited herein are hereby incorporated by reference to the same extent as if each reference were individually and specifically indicated to be incorporated by reference and/or were set forth in its entirety herein.

The use of the terms "a" and "an" and "the" and similar referents in the specification and in the following claims are to be construed to cover both the singular and the plural, unless otherwise indicated herein or clearly contradicted by context. The terms "having," "including," "containing" and similar referents in the specification and in the following claims are to be construed as open-ended terms (e.g., meaning "including, but not limited to,") unless otherwise noted. Recitation of ranges of values herein are merely intended to serve as a shorthand method of referring individually to each separate value inclusively falling within the range, unless otherwise indicated herein, and each separate value is incorporated into the specification as if it were individually recited herein. All methods described herein can be performed in any suitable order unless otherwise indicated herein or clearly contradicted by context. The use of any and all examples, or exemplary language (e.g., "such as") provided herein, is intended merely to better illuminate embodiments of the invention and does not pose a limitation to the scope of the invention unless otherwise claimed. No language in the specification should be construed as indicating any non-claimed element as essential to each embodiment of the present invention.

Numerical data may be expressed or presented herein in a range format. It is to be understood that such a range format is used merely for convenience and brevity and thus should be interpreted flexibly to include not only the numerical values explicitly recited as the limits of the range, but also interpreted to include all of the individual numerical values or sub-ranges encompassed within that range as if each numerical value and sub-range is explicitly recited. As an illustration, a numerical range of "about 1 to 5" should be interpreted to include not only the explicitly recited values of about 1 to about 5, but also include individual values and sub-ranges within the indicated range. Thus, included in this numerical range are individual values such as 2, 3 and 4 and sub-ranges such as 1-3, 2-4 and 3-5, etc. This same principle applies to ranges reciting only one numerical value (e.g., "greater than about 1") and should apply regardless of the breadth of the range or the characteristics being described. A plurality of items may be presented in a common list for convenience. However, these lists should be construed as though each member of the list is individually identified as a separate and unique member. Thus, no individual member of such list should be construed as a de facto equivalent of any other member of the same list solely based on their presentation in a common group without clear indication to the contrary.

As used herein, the term "alternatively" refers to selection of one of two or more alternatives, and is not intended to limit the selection to only those listed alternatives or to only one of the listed alternatives at a time, unless the context clearly indicates otherwise. The term "substantially" means that the recited characteristic, parameter, or value need not be achieved exactly, but that deviations or variations, including for example, tolerances, measurement error, measurement accuracy limitations and other factors known to those of skill in the art, may occur in amounts that do not preclude the effect the characteristic was intended to provide.

Different arrangements of the components depicted in the drawings or described above, as well as components and steps not shown or described are possible. Similarly, some features and subcombinations are useful and may be employed without reference to other features and subcombinations. Embodiments of the invention have been described for illustrative and not restrictive purposes, and alternative embodiments will become apparent to readers of this patent. Accordingly, the present invention is not limited to the embodiments described above or depicted in the drawings, and various embodiments and modifications can be made without departing from the scope of the claims below.

That which is claimed is:

1. A method for telephone number grouping, comprising:
provisioning, by a telephone service provider, a plurality of telephone numbers including associating each of the plurality of telephone numbers with a distinct physical telephone service user device of a grouped plurality of physical telephone service user devices, the quantity of the plurality of telephone numbers being no greater than the quantity of the grouped plurality of physical telephone service user devices;
registering, with a telephone number grouping service, at least two telephone numbers of the plurality of telephone numbers as grouped telephone numbers with respect to incoming and outgoing telephone calls to and from the grouped plurality of physical telephone service user devices;
providing, by the telephone service provider to the telephone number grouping service, at least partial call control for incoming and outgoing telephone calls with respect to the grouped telephone numbers;
with respect to incoming telephone calls to the grouped telephone numbers, activating one or more of the grouped plurality of physical telephone service user devices associated with the grouped telephone numbers in accordance with a grouped telephone number incoming call policy that governs incoming telephone calls to the grouped plurality of physical telephone service user devices, the grouped telephone number incoming call policy being capable of causing activation of multiple of the grouped plurality of physical telephone service user devices responsive to an incoming call; and
with respect to an outgoing telephone call from a physical telephone service user device associated with the grouped telephone numbers, causing the outgoing telephone call to appear to originate from a selected telephone number of the grouped telephone numbers in accordance with a grouped telephone number outgoing call policy that governs outgoing telephone calls from the grouped plurality of physical telephone service user devices, the grouped telephone number outgoing call policy being capable of designating each of the grouped telephone numbers associated with the grouped plurality of physical telephone service user devices as the selected telephone number.

2. A method in accordance with claim 1, wherein the telephone service provider comprises the telephone number grouping service.

3. A method in accordance with claim 1, wherein each provisioned telephone number is associated with a subscriber identity module (SIM) of the distinct physical telephone service user device.

4. A method in accordance with claim 1, wherein the grouped telephone number incoming call policy or the grouped telephone number outgoing call policy is user-configured.

5. A method in accordance with claim 1, wherein the plurality of telephone numbers are initially provisioned such that each telephone number of the plurality of telephone numbers corresponds to exactly one physical telephone service user device of the grouped plurality of physical telephone service user devices.

6. A method in accordance with claim 1, wherein a single owner of the grouped plurality of physical telephone service user devices specifies the grouped telephone number incoming call policy and the grouped telephone number outgoing call policy.

7. A method in accordance with claim 1, wherein the outgoing telephone call appears to originate from the selected telephone number independent of which of the grouped plurality of physical telephone service user devices is used to originate the outgoing telephone call.

8. A method for telephone service activity processing, comprising:

registering at least two telephone numbers of a plurality of telephone numbers as grouped telephone numbers, the plurality of telephone numbers having been provisioned by a telephone service provider as each associated with a distinct physical telephone service user device of a grouped plurality of physical telephone service user devices, the quantity of the plurality of telephone numbers being no greater than the quantity of the grouped plurality of physical telephone service user devices;

receiving, from the telephone service provider, at least partial service control for telephone service activity with respect to the grouped telephone numbers; and

processing the telephone service activity in accordance with a grouped telephone number call policy that governs telephone calls to and from the grouped plurality of physical telephone service user devices such that outgoing service activity appears to originate from a single telephone number of the grouped telephone numbers and incoming service activity directed to a specified telephone number of the grouped telephone numbers is forwarded to one or more associated physical telephone service user devices independent of the specified telephone number of the grouped telephone numbers, wherein the grouped telephone number call policy is capable of causing activation of multiple of the grouped plurality of physical telephone service user devices responsive to incoming service activity and is capable of designating each of the grouped telephone numbers associated with the grouped plurality of physical telephone service user devices as the specified telephone number.

9. A method in accordance with claim 8, wherein the telephone service activity comprises one or more of: a telephone call, or a short message service (SMS) message.

10. A method in accordance with claim 8, wherein receiving at least partial service control comprises one or more of: being delegated responsibility for one or more aspects of a telephony protocol with respect to the telephone service activity, being enabled to modify one or more aspects of a telephony protocol with respect to the telephone service activity, or becoming a service proxy with respect to the telephone service activity.

11. A method in accordance with claim 8, wherein receiving at least partial service control comprises one or more of:

intercepting a telephone call destined for one or more of the grouped telephone numbers, being forwarded a telephone call destined for one or more of the grouped telephone numbers, intercepting a telephone call originated by one or more of the grouped telephone numbers, being forwarded a telephone call originated by one or more of the grouped telephone numbers.

12. A method in accordance with claim 8, wherein receiving at least partial service control comprises one or more of: intercepting a short message service (SMS) message destined for one or more of the grouped telephone numbers, being forwarded an SMS message destined for one or more of the grouped telephone numbers, intercepting an SMS message originated by one or more of the grouped telephone numbers, being forwarded an SMS message originated by one or more of the grouped telephone numbers.

13. A method in accordance with claim 8, wherein processing the telephone service activity comprises one or more of: performing one or more aspects of a telephony protocol with respect to the telephone service activity, modifying one or more aspects of a telephony protocol with respect to the telephone service activity, acting as a service proxy with respect to the telephone service activity, or causing one or more telephone service user devices associated with the grouped telephone numbers to be signaled in accordance with a telephony protocol.

14. A method in accordance with claim 8, wherein processing the telephone service activity comprises one or more of: causing a telephone call to be forwarded to one or more telephone service user devices associated with the grouped telephone numbers, or causing a telephone call to be forwarded to each telephone service user device associated with the grouped telephone numbers.

15. A method in accordance with claim 8, wherein processing the telephone service activity comprises one or more of: causing a short message service (SMS) message to be forwarded to one or more telephone service user devices associated with the grouped telephone numbers, or causing an SMS message to be forwarded to each telephone service user device associated with the grouped telephone numbers.

16. A method in accordance with claim 8, wherein receiving at least partial service control for the telephone service activity comprises receiving at least partial service control for a telephone call originating from a first telephone number of the grouped telephone numbers and processing the telephone call comprises modifying data associated with the telephone call to cause the telephone call to appear to originate from a second telephone number of the grouped telephone numbers.

17. A system for telephone service activity processing, comprising:

a user interface component configured at least to register at least two telephone numbers of a plurality of telephone numbers as grouped telephone numbers, the plurality of telephone numbers having been provisioned by a telephone service provider as each associated with a distinct physical telephone service user device of a grouped plurality of physical telephone service user devices, the quantity of the plurality of telephone numbers being no greater than the quantity of the grouped plurality of physical telephone service user devices;

a telephone service provider interface component configured at least to receive, from the telephone service provider, at least partial service control for telephone service activity with respect to the grouped telephone numbers; and

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a telephone service activity handling component configured at least to process the telephone service activity in accordance with a grouped telephone number call policy that governs telephone calls to and from the grouped plurality of physical telephone service user devices such that outgoing service activity appears to originate from a single telephone number of the grouped telephone numbers and incoming service activity directed to a specified telephone number of the grouped telephone numbers is forwarded to one or more associated physical telephone service user devices independent of the specified telephone number of the grouped telephone numbers, wherein the grouped telephone number call policy is capable of causing activation of multiple of the grouped plurality of physical telephone service user devices responsive to incoming service activity and is capable of designating each of the grouped telephone numbers associated with

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the grouped plurality of physical telephone service user devices as the specified telephone number.

18. A system in accordance with claim 17, wherein the telephone service provider interface component is communicatively coupled with a telecommunications switch of the telephone service provider.

19. A system in accordance with claim 17, wherein the user interface component maintains a graphical user interface configured at least to enable users of the system to specify the at least two telephone numbers to be registered as the grouped telephone numbers.

20. A system in accordance with claim 17, wherein the user interface component maintains a graphical user interface configured at least to enable users of the system to specify the grouped telephone number call policy for the grouped telephone numbers.

* * * * *

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AT&T to let customers link their smartphone number to wearables and other devices through 'NumberSync' service

by *Phil Goldstein* | Oct 14, 2015 12:42pm

AT&T Mobility (NYSE: T) is rolling out a new service called "NumberSync" that will let customers share their primary mobile phone numbers with their connected devices so that they do not need to use Bluetooth or other technologies to link their phone to wearables or other gadgets. The goal is to untether customers from their smartphones by having the same number linked to multiple devices, and the first compatible NumberSync devices will be available later this month.

AT&T has been testing the concept, which grew out of work done at its foundry in Palo Alto, Calif., for some time, and used to call it "twinning." Now, the service is finally ready for commercialization. "This is really a first in the industry that we are giving customers the ability to do this," AT&T Mobility CEO Glenn Lurie told *Re/code.*

The solution, which will be free of charge, operates in AT&T's network using IMS technology and call and text message resolution occurs within the network. That means that a customer's primary phone doesn't even need to be powered on or even connected to the network for it to work. If customers miss a call, they can manage all voicemails from a single inbox.

Using NumberSync, AT&T envisions a world in which customers will be able to have more of their gadgets connected and will no longer need both a connected fitness band and their smartphone to stay connected when they go for a run, or can leave their phone in their car and stay connected via their smart watch at a local soccer game. When customers receive calls or send text messages from those devices, it will come from their normal number.

The service is expected to be primarily aimed at tablets and wearables at first, Jeff Bradley, senior vice president of device marketing and developer services at AT&T Mobility, told *The Verge.* Since NumberSync is a network-based service it won't be limited to just one device or operating system.

"AT&T is actively working with our ecosystem to integrate NumberSync with future devices," AT&T Mobility CMO David Christopher said in a company blog post. "We're really excited about bringing this functionality to market soon. We expect to launch NumberSync on our first device fairly soon with additional devices launching in the holiday timeframe."

Christopher said AT&T is "taking a standards-based, network approach that will make connecting a wide variety of devices easier to give you a better user experience. Our plan is for NumberSync to become the norm on a variety of our future connected 'devices.' We'll share more information on details soon, so stay tuned for updates."

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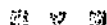Feb 26, 2016

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